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EDITED BY

C. W. VALENTINE

(*Professor of Education in the University of Birmingham*)

WITH THE ASSISTANCE OF

SIR JOHN ADAMS
R. L. ARCHER
CYRIL BURT
JAMES DREVER
SUSAN ISAACS
H. CRICHTON MILLER
SIR T. PERCY NUNN
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AND THE FOLLOWING REPRESENTATIVES OF OTHER COUNTRIES:

CHARLOTTE BÜHLER
I. MEYERSON
PETER PETERSEN
JEAN PIAGET
W. STERN
L. M. TERMAN
E. L. THORNDIKE

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INDEX TO VOL. I, 1931.

Articles :

PAGE

Adolescents, Variations in the Emotional Development of Normal 1
(Olive A. Wheeler.)

Child Psychology, Retrospective and Prospective Analysis in .. 130
(Jean Piaget.)

Children under Seven Years of Age, Education of.. 257
(British Psychological Society and Susan Isaacs.)

Concepts, The Development of 13
(H. L. Fowler.)

Delinquent Girls described as Leaders, Some Case Studies of .. 162
(S. Clement Brown.)

Disciplinary Value of Studies, Discernment of the 41
(Helen Wodehouse.)

Examination and Intelligence-test Forecasts of School Achievement 73
(A. Donald Amos.)

Infant Psychology, Modern Trends in 119
(V. Hazlitt.)

Maladjusted Child, The 266
(G. A. Auden.)

Marking, The Basis of 296
(Frank Sandon.)

Mental Tests to University Students, An Application of 279
(H. D. Jennings White.)

Musical Ability: Experiments on the Analysis of Cognitive Processes involved in Musical Ability and in Musical Education 180
(James Mainwaring.)

PAGE

Musical Ability, Tests of 313
(James Mainwaring.)

Revision, A Comparison of the Effects on Retention of various Methods of 204
(Eric Eaglesham.)

Teaching Ability, The Assessment of 48
(R. B. Cattell.)

Teaching Profession, An Analysis of the Motives of Adolescents for the choice of the 87
(F. M. Austin.)

Training of Teachers: A Report on an Enquiry into Values of Professional Courses in (Part I) 225
(Margaret Phillips.)

"Two Factors": The Theory of "Two Factors" and that of "Sampling" 140
(C. Spearman.)

Vocational Selection, Present Tendencies in 246
(Eric Farmer.)

Critical Notices:

Isaacs, Susan: Intellectual Development of Young Children .. 106
(C. W. Valentine.)

McCallister, W. J.: The Growth of Freedom in Education .. 322
(F. A. Cavenagh.)

Report of Consultative Committee: The Primary School.. .. 215
(Susan Isaacs.)

Authors:

Amo- [illegible] 'nation and Intelligence-test Forecasts 73

Auden, G. A.: The Maladjusted Child 265

Austin, F. M.: An Analysis of the Motives of Adolescents for the choice of the Teaching Profession 87

British Psychological Society: Education of Children under Seven Years of Age 257

PAGE

Brown, S. Clement: Some Case Studies of Delinquent Girls described as Leaders 162

Cattell, R. B.: The Assessment of Teaching Ability 48

Eaglesham, Eric: A Comparison of the Effects on Retention of various Methods of Revision 204

Farmer, Eric: Present Tendencies in Vocational Selection .. 246

Fowler, H. L.: The Development of Concepts 13

Hazlitt, V.: Modern Trends in Infant Psychology 119

Isaacs, Susan: Education of Children under Seven Years of Age.. 257

Mainwaring, James: Experiments on the Analysis of Cognitive Processes involved in Musical Ability and in Musical Education 180

Mainwaring, James: Tests of Musical Ability 313

Phillips, Margaret: Professional Courses in the Training of Teachers: A Report on an Enquiry into Values. (Part 1) .. 225

Piaget, Jean (Translated by E. W. Tait): Retrospective and Prospective Analysis in Child Psychology 130

Sandon, Frank: The Basis of Marking 296

Spearman, C.: The Theory of "Two Factors" and that of "Sampling" 140

Wheeler, Olive A.: Variations in the Emotional Development of Normal Adolescents 1

White, H. D. Jennings: An Application of Mental Tests to University Students 279

Wodehouse, Helen: Discernment of the Disciplinary Value of Studies 41

VOLUME I. FEBRUARY, 1931. PART 1.

VARIATIONS IN THE EMOTIONAL DEVELOPMENT OF NORMAL ADOLESCENTS.*

BY OLIVE A. WHEELER.

I.—*Emotional development during adolescence.*
II.—*Variations in time and rate of emotional development.*
III.—*Variations in general emotionality.*
IV.—*Variations in emphasis on the chief kinds of emotional developments.*
V.—*Differences between the sexes.*
VI.—*Environmental influences affecting variations.*
(*a*) *Family circle.*
(*b*) *School or college.*
(*c*) *Modern social and industrial conditions.*
(*d*) *Religious organization.*

I.—EMOTIONAL DEVELOPMENT DURING ADOLESCENCE.

THERE is one obvious difficulty in the discussion of this subject which should be faced at the outset. Who or what are "normal" adolescents? If adolescence be defined as the period of life between childhood and maturity beginning with the pubertal changes, then what is usual or "normal" during this period of rapid and many-sided growth may be very different from the normal behaviour and experience either of childhood or of maturity. Boys and girls in their teens who can neither be classed as defective, delinquent, nor neurotic, may yet be unstable, impulsive, and wayward. Even if it be their future destiny to stiffen into the backbone of the nation to which they belong, during youth there are such rapid and varied developments taking place that it is impossible to define the "normal" in terms of stereotyped behaviour or standardized experience. When the technique of measuring emotional and temperamental qualities is as highly developed as are the present methods of estimating general intelligence, it may become possible to define the normal more exactly as those who fall within a certain range of variations of intelligence and emotionality, say, the middle 50 or 60 per cent of any unselected group of adolescents. At present, however, all that

* A paper read to the Psychology Section of the British Association, Bristol, 1930.

can be done is to make provisional judgments concerning what is usual from the consideration of three lines of evidence: (*a*) direct observations by responsible adults of the behaviour of boys and girls, in schools and colleges for adolescents, or at work in the world, who do not vary sufficiently to need special treatment; (*b*) diaries and life-stories written by adolescents; and (*c*) answers to questionnaires concerning the period of youth embodying the recollections of adults who have recently passed through the period without disaster.

The earlier monumental researches of Professor Stanley Hall,* the recent views of Professor Leta Hollingworth,† and my own investigations by questionnaire,‡ point to one conclusion, that there is usually an increase of emotionality as well as of intelligence during the period of adolescence, which shows itself in three main directions tending towards three major adjustments. There is, in the first place, an increased feeling for *self* tending towards the development of psychological independence and the finding of a vocation; secondly, there is the rise or the intensification of *sex* emotions tending towards the development of a hetero-sexual attitude and the finding of a mate; and, thirdly, there is the development of *social, æsthetic,* and *religious* emotions, tending towards the formulating of a point of view on society and on life in general.

* G. S. Hall, *Adolescence*, 1904.

† L. S. Hollingworth, *The Psychology of the Adolescent*, 1929.

‡ O. A. Wheeler, *Youth*, 1929, Tables I, II, III, and IV, embodying the replies of students and workers (men and women) to the following questionnaire:

ADOLESCENCE.

NOTE.—Adolescence can be interpreted to mean the period from about 11 or 12 to about 20 or 21 years of age.

A.—PARTICULARS TO BE FILLED IN BELOW:

Name or Initials..... Nationality .....

Age..... Sex.....

Home conditions during Adolescence (i.e., whether parents were living, number of brothers and sisters, etc.)

.....

Secondary School (Girls', Boys', or Mixed) (with rough dates)

.....

Post-School Occupation (with rough dates).

.....

B.—QUESTIONS (TO BE ANSWERED ON EXAMINATION PAPER AND ATTACHED):

(1) Indicate any developments in intellectual interest which occurred *during adolescence*. For example, what were your favourite [illegible] your favourite subjects of study? Account as far

II.—VARIATIONS IN TIME AND RATE OF EMOTIONAL DEVELOPMENT.

The observations of adults who are in daily contact with normal adolescents agree with the results obtained by the questionnaire method that variations occur both in the time and the rate of emotional development. For example, among a group of University students who answered the above questionnaire on adolescence under experimental conditions there were some who confessed to feeling a great interest in the opposite sex as early as 11 or 12, though the great majority did not develop in this direction until 16 or 17 and some not until 21 or even later. Some experienced only a vague interest in the opposite sex, whereas some fell violently in love like the man who confessed to " falling in and out of love continuously," beginning with all the ladies who successively taught him the piano and ending with the girl who afterwards became his wife. In æsthetic, social, and religious developments, there were corresponding variations. Although in the majority of cases (of University students) there was a gradual awakening to spiritual values, in some there were sudden conversions, varying in date from one at 7 years, a few at 10, 11, or 12, the majority of the women at 14 or 15, and of the men at 16 or 17, and a few considerably later.

Footnote to page 2—continued.

(2) Do you remember having systematic day dreams (*a*) during childhood, and (*b*) during adolescence ? If so, of what kind ? Do they still continue ?

(3) Can you remember any differences in your appreciation of nature, music, art and poetry *during childhood* and *adolescence* ?

(4) Describe briefly the kind of religious training that you received *during childhood* and *adolescence*.

(5) What kind of religious experiences (if any) did you have (*a*) during childhood and (*b*) during adolescence ?

(6) Did you experience " conversion " ? If so, when ? What form did it take ?

(7) Did you experience doubts (*a*) before, and (*b*) after conversion ? If so, of what kind ?

(8) Were you interested in the opposite sex during adolescence ?
In particular, did you fall in love (*a*) with anyone much older than yourself, and (*b*) with someone of your own age ? If so, when ?

(9) Did you make life-long friends at this period ?

(10) Did you hero-worship someone of your own sex ?

(11) Were you curious concerning the facts of life (*a*) during childhood, and (*b*) during adolescence ? Was your curiosity satisfied ? If so, from what source ?

III.—Variations in general emotionality.

The records also suggest a great range of variations in the intensity of the new emotional experiences. In some cases there appeared to be a great accession of energy along each of the three chief channels of experience and adjustment. If Dr. Burt's hypothesis of a central emotional factor,* which has recently received further experimental support by Dr. Oates' work on Downey Will-Temperament tests,† be accepted, there would appear to be great variations in general emotionality, just as there are in general intelligence. There are some whose recollections of their ambitions, sex experiences, æsthetic, social, and religious developments during adolescence are only consistent with the hypothesis of great general emotionality. One Celtic student, for example, was unable to finish answering the questionnaire on adolescence because of the emotional upset caused by the mere recall of adolescent experiences. Others were obviously less generally emotional. When the methods of measurement of this central emotional factor are as developed as those of general intelligence, the study of the relationship between these two general factors in experience may throw a flood of light on the conditions of instability and the nature of individual variations. Cases as far apart as that described by Shaw Desmond in *The Love Diary of a Boy*, where there was apparently great emotionality and only average intelligence, and that of J. S. Mill as revealed in his *Autobiography*, where there was unusual intelligence and only average or less than average emotionality, may receive explanation in terms of these two variables.

IV.—Variations in emphasis on the chief kinds of emotional developments.

Only very tentative conclusions can be drawn at present concerning variations which occur in the relative strengths of the different types of emotional experience and the balance preserved between them. Comparisons of the answers to the questionnaire on adolescence by workers who had left school at an early age and by University students reveal the fact that a higher proportion of the former had systematic day-dreams, and recalled the development of the sexual and social emotions during the period and a lower proportion the intensification of æsthetic and religious emotions. The following table indicates the chief differences in these respects:

* British Association Report, 1923, page 235.

† D. W. Oates, *Group Factors in Temperament Qualities*, British Journal of Psychology, October, 1929.

COMPARISON OF WORKERS AND STUDENTS.

	Workers.	*Students.*
Q. 2. Percentage who record systematic daydreams in adolescence	83	64
Q. 3. Percentage who record an increase in appreciation during adolescence in respect to :		
Nature	71	54·5
Music	40	59
Art	40	42·5
Poetry	29	63
Q. 5. Percentage who record religious experiences		
(*a*) in childhood	9	8·5
(*b*) in adolescence	50	61·5
Q. 8. Percentage who record an interest in the opposite sex during adolescence	91	83·5
Q. 9. Percentage who record important friendships during adolescence	90	73·5
Q. 10. Percentage who record hero-worship during adolescence	80	50·5

Within the student group there were also slight contrasts between sub-groups. For example, the following table shows the results of a comparison of a group of women students from Manchester University and of a similar sized group from Cardiff University College :

COMPARISON OF MANCHESTER UNIVERSITY AND CARDIFF UNIVERSITY COLLEGE WOMEN STUDENTS.

	Women Students from Manchester.	*Cardiff.*
Q. 2. Percentage who record systematic daydreams in adolescence	82	78
Q. 3. Percentage who record an increase of appreciation during adolescence in respect to		
Nature	60	57
Music	64	76
Art	51	44
Poetry	73	67
Q. 5. Percentage who record religious experiences		
(*a*) in childhood	5	18
(*b*) in adolescence	64	53
	69	71
Q. 8. Percentage who record an interest in the opposite sex during adolescence	66	83
Q. 9. Percentage who record important friendships	69	78
Q. 10. Percentage who record hero-worship	60	48

interested in the opposite sex and make important friendships during adolescence, and develop an appreciation of nature and the arts (especially music) : a smaller proportion have recourse to hero-worship as compared with the Northern group. Whether these differences are to be interpreted to mean a slightly higher general emotionality of the Welsh group or a different emphasis on sexual, social, æsthetic, and religious emotions as compared with emotions directed towards the self it is impossible to judge without further investigations.

Dr. Cyril Burt has recently put forward the view* from the consideration of positive and negative correlations that certain instincts (and emotions) tend to go more closely together than others and that two broad emotional types can be distinguished according to whether the emphasis is on the *active* group of emotions such as anger, positive self-feeling, and possibly sex, or on the *passive* group, such as fear, negative self-feeling, and gregariousness. These two types might be described as *unrepressed* and *inhibited* respectively, and correspond very closely to Jung's " extraverts " and " introverts," and to Kretschner's " cycloid " and "schizoid " temperaments. They are probably only extreme instances of smaller deviations which are widespread.

V.—Differences between the sexes.

The inclusion of sex in the active group of emotions in all cases is open to some doubt, and this difficulty will need to be considered in discussing the chief emotional differences between the sexes. Apart from the earlier emotional maturity of the girl the most striking difference between the sexes is probably to be found in a difference of emphasis on the active and passive groups of emotions. Dr. Cyril Burt's investigations into the causes of juvenile delinquency and his classifications of juvenile " crimes " show that the instincts that most easily get out of control in the case of boys are the aggressive ones (such as pugnacity and acquisition); whereas in the case of girls they tend to be the passive ones, giving rise to misdemeanours such as lying, sex offences, and attempted suicides. What is true of these delinquents seems also to be true of normal adolescents, for statistics collected by the questionnaire method reveal the probability that proportionately more women and girls than men and boys tend to

* British Association Report, 1923, page 236.

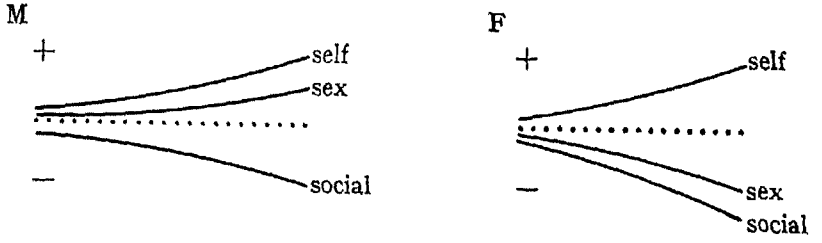
of evidence that supports this view is contained in the diaries and literary productions of adolescents collected and studied by Oskar Kupky.† The religious poems of the girls are marked by an attitude of prayer and dependence: there is no parallel among them to the attitude of titanic aggression found among some of the boys and expressed, for example, in the following poem written by a lad of eighteen:

> Come, let us live
> Free of the Godhood
> Free of religion.
> We are almighty
> We shall live always
> In spite of the Lord God.—(GIESE, No. 192.)

The wide-spread application of intelligence tests has not revealed any marked difference between the average intelligence of the two sexes, but there is an accumulation of evidence in favour of the view that highly intelligent girls and women find it more difficult to attain that eminence in professional, business, or cultural life which is justified by their intellectual ability. This difficulty may still be partly due to environmental conditions, but there does also seem to be a tendency towards a different organization of the emotions, which shows itself especially in a greater liability to conflict between egoistic and sexual and social emotions in the case of girls than in the case of boys. It will probably be agreed that the emotions directed towards the self may be considered as *active* in both sexes; but it seems as though in the one sex where there is harmony between egoistic and sex emotions, the resultant will certainly be *active*; whereas in the other, where there is a perpetual liability to conflict between them, the resultant may tend to be relatively *passive*, although *a priori* there may be an infinite series of gradations. Burt's tentative classification of sex in the *active* group of emotions is then open to objection, at least in regard to the one sex.

Indeed the main emotional differences between the sexes appear to have their roots in a fundamental difference in the activity of the sex impulse. In the one case, the sex impulse reinforces the egoistic trends; in the other it tends to tip the balance in favour of the social and self-sacrificing impulses, as is indicated in the following diagrams:

* Wheeler, *Youth*, pages 86-87, Table III.
† Kupky, *The Religious Development of Adolescents*, Tr. Trow, 1928.



VI.—Environmental influences affecting variations.

There remains to be considered one question of great practical importance to parents, teachers, and other trainers of youth, namely, the influence of environment on the emotional development of normal adolescents. It is believed by many psychologists that emotional maturity is much more affected by training and circumstances than is any other phase of development.

(*a*) *The Family Circle.*

Flügel has shown in his psycho-analytic study of the family* how the emotional attitudes of an adult may be largely influenced by his place in, and the nature of, the family group which constituted his early social environment. The three major adjustments of adolescence can thus be helped or hindered by family conditions prior to this period, and especially by the attitude of the parents to the growing-up of their child or children. Many fathers and mothers fail to realize the increasing need for economic and psychological independence during the period. They tend to keep their sons and daughters in emotional leading-strings and to allow them too little freedom of thought and action. They do not always realize how significant to the self-respect of the adolescent is the possession of an income, earned or unearned, and perhaps even the possession of a latchkey. These may be only outward symbols of a growing psychological independence ; but if they are denied, and if the usual treatment meted out to the youth appears to him or her to be harsh and unsympathetic, there may result a deep-rooted objection to parental authority and even a growing hatred of the parent who appears most to exercise it. It is in family circles where the father occupies a position of authority and the mother one of economic dependence that friction of this kind is most likely to arise. Indeed, if we may accept the evidence of Malinowski†

* J. G. Flügel, *The Psycho-Analytic Study of the Family*, 1921.
† B. Malinowski, *Psycho-analysis and Anthropology*, Psyche, April, 1924.

there is no marked tendency to such disharmonies within the family circles of a matrilineal society. In any case, in a society such as ours, it is supremely important for both parents to act as though they were willing for their children to mature and have their independence. Otherwise the natural psychological weaning has either to be unpleasantly abrupt or, what is worse, to be unnaturally incomplete. In the first case, there results a tragedy in family relationships like that described by Edmund Gosse in *Father and Son*: in the second, there may be such an interference with emotional development that the adolescent never matures but remains permanently unable to shoulder the full responsibilities of adult life. A triangular family relationship may also hinder the second great adjustment of adolescence associated with the control and functioning of the sex impulse, and may even affect the individual's whole attitude to authority and his general philosophy of life.

(*b*) *The School or College.*

The nature of the school or other similar community of which the adolescent is a member may also affect his or her emotional development. If the growth of a hetero-sexual attitude is an essential part of the growing-up process, it would seem on psychological grounds that there ought to be a social environment provided for adolescents in which there are members of the opposite sex, in sufficient numbers and of appropriate age, to allow of this development. The distorted romance of a young Woodley who in the atmosphere of a boys' public school fell violently in love with the head master's young wife—the only attractive woman in the school community—certainly rings true, and shows Van Druten to be a dramatist with real insight into adolescent psychology. The unhealthy and surreptitious interest in sex matters rampant in some boys' boarding schools, the tendency to unnatural hero-worship of members of the same sex found in some girls' schools, are surely signs of difficulties of adjustment caused largely by an incomplete social environment, signs which should at least make us pause before accepting without further investigation and experiment the traditional English views concerning co-education, day versus boarding schools, and the teaching of biology to adolescents.

(*c*) *Modern Social and Industrial Conditions.*

The gradual lengthening of the preparation period for entrance into many professions introduces a new complication in the way of the harmonious emotional development of some adolescents. The attainment of biological maturity may take place under modern conditions years

before there can be economic independence : and difficulties may therefore be experienced in synchronizing the three major adjustments of adolescence. The Self-help Movement which, largely through stress of economic circumstances, is beginning to be a feature of English (as of American and Scotch) University life would seem to be psychologically sound. It is surely of the greatest value to students to have a taste in their vacations of real work and responsibility, whether as clerks or teachers, in the harvest or at sea, acting as interpreters or carrying the hod. Useful work is educative of the emotions, and to have some measure of economic independence is of considerable help in the long preparation period before entrance on life's duties.

This difficulty, caused by the long preparation period necessary for entrance into the professions, is slight compared with that arising from modern industrial conditions and particularly from widespread unemployment. A young man or woman entering upon a long period of training for a profession has at least a definite ambition and a life-plan, with the aid of which he or she can hold other impulses in check ; but an unemployed adolescent, looking for any and every kind of work, lazing about and on the dole, has a very poor chance of harmonious emotional development. His times are bound to be out of joint. He finds a mate perhaps before he finds a vocation and before he is trained by work to accept responsibilities and to consider the rights and needs of others. It is therefore no exaggeration to say that the present widespread conditions of unemployment constitute the most serious environmental menace to the full and harmonious development of modern youth. The raising of the school leaving age and even the pensioning off of older workers, which may seem to some to be a luxury policy, is surely, in the light of the psychological facts, the minimum provision which a civilized society should make to provide the environmental conditions necessary for the healthy mental development of its adolescent population.

(*d*) *The Religious Organization.*

The other great environmental influence which most profoundly affects the emotional development of the normal adolescent is the religious organization (if any) with which he or she is associated. There is perhaps only one generalization of practical importance that can be safely drawn from modern psychological studies of the varied religious experiences of adults and adolescents, such as those described in James' *Varieties of Religious Experiences*, Starbuck's *Psychology of Religion*, Kupky's *The Religious Development of Adolescents*, and Wheeler's *Youth*, namely, the

need for respecting both the integrity and the unity of each individual's mind. The religion of an adolescent, if it is to be really operative, must be his own: it must synthesize his own deepest experiences. The three major adjustments of adolescence are so bound up one with one another that to attempt to dissociate the third from the other two is to complicate rather than to assist development.

RÉSUMÉ.

DES VARIATIONS DANS LE DÉVELOPPEMENT ÉMOTIF DE L'ADOLESCENT NORMAL.

Par une considération des témoignages convergents des observations faites par des adultes sur la conduite des adolescents, des réponses fournies par ceux-ci à des questionnaires, des journaux et autobiographies écrits par eux, l'auteur démontre que le développement émotif, pendant l'adolescence, suit ordinairement trois directions principales; premièrement le rehaussement du sentiment du moi, duquel résulte un mouvement vers l'indépendance psychologique; deuxièmement l'apparition, ou l'accroissement d'intensité, des émotions sexuelles; troisièmement le développement des émotions sociales, esthétiques et religieuses. Il se produit dans ce développement émotif, des variations en ce qui concerne son temps, sa vitesse, son intensité générale (ce qui semble soutenir l'hypothèse de Burt d'un facteur émotif central), et dans l'importance rélative des diverses émotions, surtout dans le cas du groupe passif des émotions et du groupe actif.

Le milieu exerce une influence puissante, pour faciliter ou troubler le développement de l'adolescent, et dans le milieu avant tout la famille. Des conditions presque universelles de chômage constituent une menace grave au développement harmonieux de l'adolescent moderne, et empêchent, dans bien des cas, le synchronisme des trois ajustements qui caractérisent le mieux cet âge de la vie.

ÜBERSICHT.

VERÄNDERUNGEN IN DER ENTWICKLUNG DER GEMÜTSBEWEGUNGEN IM NORMALEN JÜNGLINGSALTER.

Indem sie zusammenlaufende Beweislinien aus den Betrachtungen Erwachsener in Bezug auf das Benehmen junger Menschen, aus den Antworten auf Fragelisten, und aus den von Jünglingen geschriebenen Tagebüchern und Lebensgeschichten in Betracht zieht, zeigt die Verfasserin, dass die Entwicklung der Gemütsbewegungen im Jünglingsalter gewöhnlich in drei Hauptrichtungen stattfindet; erstens, in einem gesteigerten Selbstgefühl, das nach psychologischer Unabhängigkeit strebt; zweitens, in einer Steigerung oder Anspannung von Geschlechtsempfindungen; und drittens, in der Entwicklung sozialer, ästhetischer und religiöser Gefühle. Veränderungen kommen in dem Tempo dieser Gefühlsentwicklung vor; in ihrer allgemeinen

Stärke (welches scheint, mit Burts Voraussetzung eines zentralen Gefühlsfaktors im Einklang zu sein) ; und in einer Verschiedenheit des Nachdruckes auf verschieden en Empfindungen, besonders auf der aktiven und passiven Gruppe der Gemütsbewegungen.

Einflüsse der Umgebung spielen eine grosse Rolle, indem sie die Gefühlsentwicklung eines Jünglings unterstützen oder stören ; und der grösste dieser Einflüsse ist der Familienkreis. Weit verbreitete Arbeitslosigkeit bedroht die friedliche Entwicklung der modernen Jünglinge und in manchen Fällen hemmt sie die Gleichzeitigkeit der drei eigentümlichsten Berichtungen der Periode.

[The Editor wishes to express his thanks to his colleagues Miss E. W. Tait and Mr. A. Thorburn for kindly undertaking the task of translating the résumés of the various articles in the Journal into French and German respectively.]

THE DEVELOPMENT OF CONCEPTS*:

AN INVESTIGATION INTO METHODS OF TEACHING.

(*From the Psychological Laboratory, University College, London.*)†

BY H. L. FOWLER.

I.—*Statement of the problem.*
II.—*Description of the experiments.*
(*a*) *Analysis of problem.*
(*b*) *The teaching methods.*
(*c*) *The principles of procedure.*
(*d*) *The tests described.*
III.—*The results.*
(*a*) *The first concept.*
(*b*) *The second concept.*
(*c*) *The third concept.*
(*d*) *Application to grammatical material.*
IV.—*General summary and conclusions.*
V.—*Appendix and bibliography.*

I.—STATEMENT OF THE PROBLEM.

THE following investigation was undertaken with a view to obtaining some experimental evidence as to the best way of developing concepts in teaching practice. To this end a typical class-room problem—the teaching of the adjective-noun relationship—was analysed from a psychological point of view, certain artificial concepts of a nature psychologically akin were constructed, and these taught in different ways. In this way quantitative results were obtained, which, it is claimed, have a direct bearing on teaching procedure.

Hitherto there has been very little experimental research on the problems associated with methods of teaching. These methods have frequently been based on unfounded assumptions as to the way in which

* This paper is an abridgment and reorganization of a thesis approved for the degree of Ph.D. in the University of London. For further details the reader is referred to the Library of the University of London, where the thesis is deposited.

† My thanks are due to the Education Committee of the London County Council for permission to enter the schools under their control, and also to those teachers who so kindly admitted me to their schools and classes. But to Professor C. Spearman, under whose direction the research was conducted, I owe a debt that I cannot adequately express.

the mind learns. Statements such as that of Burnett (No. 1, page 84): "That is to say the psychological order of analysis and synthesis determines what is the only valid general method of teaching," abound in educational literature, and hardly any attempt has been made at precise and careful investigation. Thus Sir John Adams (No. 2, page 1) says: "In teaching it is now generally admitted that we ought rather to lead up to a definition than to start from one." This statement he exemplifies by an example of the "heuristic method" employed in the teaching of Euler's theorem. As a result of the method thirty-five out of seventy children were able to reach the generalization, a result which is quoted with approval. But these figures force one to ask whether a more economical and effective method might not have been employed.

Underlying teaching methods such as that above mentioned, and kindred ones such as the "Dalton Plan," is the assumption that all teaching where the development of a new concept is attempted should follow what is regarded as the psychological method by which "concepts" are developed by children. This method consists, in essence, in allowing the child to develop his own concept from the presentation of a number of particular instances. But it might be asked in passing whether this is the only "normal" method in which general ideas are developed. The truth appears to be that it is as natural for the child to ask for definitions and to get his concepts in an abstract way as it is for him to start always from the beginning and develop them himself. If left to himself the child quickly realizes that the "heuristic" method is far too slow.

Another assumption underlying much of current educational literature is that giving concepts to children is bad, in that they cannot assimilate them unless they have passed through the stages which are usually recognized as normal. Thus Miller (No. 3, page 225) says: "Concepts cannot be handed out as ready-made finished products by the teacher and appropriated by the child. They do not thus become his concepts. He must go through the process of getting vague ideas first and having these ideas repeatedly reconstructed."

But this question, when tested in the light of experiment, seems to be hardly such a simple matter. Hull (No. 4, page 42) comes to the conclusion "What small difference there was, was in favour of giving the concepts outright," a conclusion sufficiently disturbing to current opinion to make us doubt whether all has yet been said on the matter.

It is further assumed that, if the concept is given initially to the children, their attitude will be one of passivity, in contradistinction to the active one they are said to take up in the inductive method. But is there not danger here of confusing mental activity and mere doing?

The only experimental attempt to arrive at a result which the writer was able to come across was that of Mr. W. H. Winch (No. 5). This was designed to discover which was the better method—the inductive or the deductive. Taking geometrical forms as the material of his experiment he taught the " concepts " and the definitions in two different ways. In one case, the deductive, examples were shown to the children by drawing on the blackboard. The names of the figures so drawn were in each case written above them, and the children instructed to learn the definition appended. They were told that they would be tested immediately afterwards on their ability to define them.

Another class was taught in the usual inductive manner, the teacher assisting the children and guiding the development of the " concept."

He found that, when the children were tested on precisely what they had learned, the deductive method proved on the whole the more effective. When they were tested on new material, however, the result was in favour of the inductive method.

He further noted (page 52) that " the inductive method was much less provocative of error when new material is given for test purposes."

In criticism of the above experiment, the following points might be raised :

(1) The superiority of the children taught " inductively " may possibly have been due to the fact that they had more opportunity of making eductions, because the fundaments in their case were enormously increased (No. 6, Ch. V). For the teacher gave them, by his illustrations on the blackboard, more material to work with.

(2) The children taught deductively did not have the advantage, possessed by the others, of having the teacher draw attention to the salient points.

(3) The children taught inductively were prevented from making as many errors as the others, in that, when errors did occur, they were made only by those individuals who happened to be asked the question. In the other case, the children could make errors, without any chance of their being found out and corrected.

(4) The tests were purely verbal, and did not give any opportunity to see whether there was any difference in the ability of the two groups to react to the concepts in any other way.

For these reasons, though the results of the experiments were interesting and suggestive, they could not be regarded as conclusive.

Of experiments with adults on the problem of the development of concepts, particularly interesting are those of Moore (No. 7), Aveling (No. 8), Fisher (No. 9), and Stevanovic (No. 10), all of whom used geometrical patterns containing some general structural similarity, and watched how the general idea was formed out of these particular presentations. They pointed out the effect of reproduction as a hindering process, and showed that the essential process consisted in " free eduction."

These researches, however, were qualitative in character and were based on adult introspection. They differ, therefore, in kind, from the type of work contemplated by the writer.

The quantitative research of Hull (No. 4) bears more directly on our problem. One of his results showed that there was little difference in the functional efficiency of concepts, developed deductively and inductively; that, where this efficiency is measured by drawing, the balance is in favour of the deductive method of learning; and that " ability to define is not necessarily a true index of the functional value of the concept " (No. 4, page 44).

Further experiments, in which the concepts were developed by a combined method of concrete-abstract presentation, showed that this combined method was more efficient than either of the others. These results with adult subjects suggested the propriety of trying out similar methods with children.

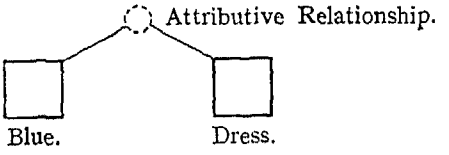
II.—Description of the Experiments.

(*a*) *Analysis of Problem.*

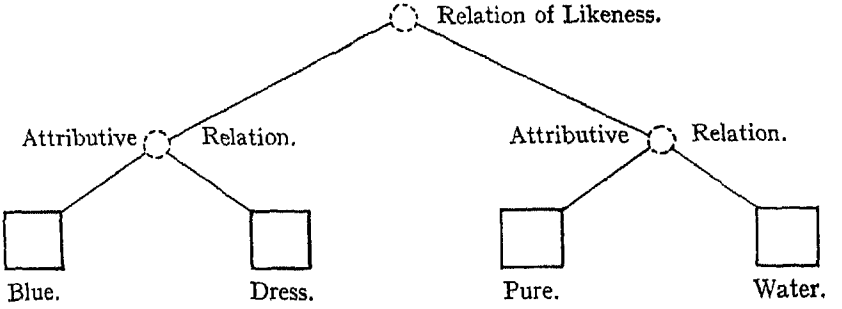
The research was designed to throw light on the best method of teaching grammatical relationships—the adjective-noun and adverb-verb relationship.

The first task was to analyse the relationships involved. This is of course the attributive one (No. 6, page 68). But the recognition of the likeness between one adjective and another involved what has been termed elsewhere a " higher level relationship " (No. 11, page 36). Thus the eduction of the relationship existing between, say, " blue " and " dress " is the ordinary relation of attribution. But the eduction of the relationship of likeness between the function of the word " blue " and the function

of the word " pure," in the phrase " pure water," is more difficult. This difference may be schematized as follows :



Simple Eduction of Relation.



Higher Level Relation.

It would have been profitable, and desirable, from a teaching point of view, if the experiment proper could have been made with this grammatical material. This, however, was difficult, since it was next to impossible to get children with no previous knowledge of the relationships involved. Artificial tests were therefore constructed.

In the construction of this artificial material the principles enunciated by Spearman (No. 6) proved of the greatest assistance. If the same relationships were to be educed, it did not seem material what the subject matter might be.

A further analysis of the adjective-noun relationship showed that, while the relationship of attribution remains the same, the items (or fundaments), between which the relationship had to be educed, continually changed. Moreover, the adjective, when coupled with the other fundament (the noun), while it did not change its nature, at least affected it to such an extent that the new composite whole was different.

After many false attempts artificial tests were at last constructed which seemed to fulfil the conditions required.

(*b*) *The Teaching Methods.*

There still remained the methods of teaching to be employed. Three main methods were chosen, as follows :

(*a*) An inductive method (from particulars to generalization).

(2) A deductive method (from generalization to particulars).

(3) A composite method (deduction with careful explanation by reference to particulars).

With all these methods it was decided to combine a variation. The problem set was to find out what effect, if any, the prevention of errors would have on each of these three methods. Accordingly, in all three, one group of children was so taught for a certain period as to prevent them from making mistakes.*

Thus the full scheme was as follows :

Method 1a† : Inductive method, without prevention of errors.

Method 1b : Inductive method, with prevention of errors for a certain period.

Method 2a : Deductive method, without prevention of errors.

Method 2b : Deductive method, with prevention of errors for a certain period.

Method 3a : Deductive method with reference to particulars (without prevention of errors).

Method 3b : Deductive method, with reference to particulars (with prevention of errors for a certain period).

(*c*) *The Principles of Procedure.*‡

The following principles suggested themselves as necessary of fulfilment if comparisons were to be drawn between the results of the different methods.

(1) All the groups, no matter what method was employed, should have exactly the same material to work on. This was done by having the

* At least an attempt was made to do this. In actual fact, as the results will show, it turned out to be a more difficult task than had been anticipated.

† In the following pages the methods will be referred to under these names.

‡ I write from Australia without a copy of Hull's research at hand. I am unable therefore to acknowledge in detail my indebtedness to him at this point. It will be sufficiently obvious to readers of his monograph.

questions duplicated on test sheets. In this way the objection made against Winch's experiment was avoided.

(2) The questions should be so numerous as to give an opportunity for any differences between the methods to be clearly apparent.

(3) Each error made should be corrected immediately.

(4) The functional value of the concept should be tested not solely by definition but by ability to recognize particular instances (perceive relations) or to educe new instances (form new correlates).

(5) The fundaments should be as varied as possible, both as regards position and nature.

(6) There should be a definite reaction required from the children at each new presentation. The children had to respond to the stimulus by writing a figure, or underlying a word or phrase, or in some other manner requiring action on their part.

(7) Provision should be made for allowing the formulation of the concept in words at different stages of the development of the concept. Thus the children were invited, at stated intervals during the experiment, to write down what they had discovered concerning the task.

(8) Provision should be made for equalizing the groups of children who were to be the subjects of the experiment. This was arranged by giving all the children who took part the first 118 questions of Spearman's Group Test of Intelligence. From these, equal groups were then chosen in the following manner : A child scoring, say, 89 in one group would be balanced by one scoring this figure in each of the other groups. In this way equal groups were chosen whose ability was the same.

For the main purposes of the experiment the equal groups so chosen consisted of 41, but for further comparison of the " a " and " b " method it was possible to choose larger groups consisting of 53, 64, and 49.* In all, there were 500 children tested from 10 to 11 years old.

(9) Apart from the differences in method the other conditions of the experiment should be kept constant. In an attempt to arrange this the writer himself administered all the tests from the printed sheets. All the children were chosen as far as possible from the same district, being of approximately the same age and attainments, and the tests were administered at the same hour each morning.

* These results, which but confirmed those of the smaller groups, are omitted from this paper.

The general plan of administration was as follows :

TABLE I.

Group.	*Concept* 1.	*Concept* 2.	*Concept* 3.
A.—(23 boys, 18 girls) ..	1a	2b	3a
B.—(15 boys, 26 girls) ..	1b	3a	1b
C.—(23 boys, 18 girls)	2b	3a	1b
D.—(16 boys, 25 girls) ..	2a	3b	1a
E.—(15 boys, 26 girls) ..	3a	1b	2a
F.—(17 boys, 24 girls)	3b	1a	2b

(*d*) *The Tests Described.*

The first test consisted of a chart (Fig. 1) which was pinned in front of the class. The object of the test was to get the children to formulate the relationship between the position of the various figures and the lengths of the base line and height. An examination of the figure will disclose the fact that the height increases according to the distance from the centre row, and that the length of the base increases to the right and left of the centre column.

The figures are drawn of different shapes to make the test more difficult for the children and to simulate the variation of the fundaments, which occurs in the case of the adjective and the noun. A further point of comparison lies in the fact that the length of the base or the alteration in the height affects the appearance of the figure, and so changes the fundaments as the addition of an adjective to a noun changes the idea expressed by that noun.

To introduce the general idea of " law," the experimenter drew lines on the blackboard, gradually increasing in length to the right. The children had no difficulty in formulating the " law" that the lines increased as they went to the right. When this idea was clearly understood, the diagram was uncovered and the fact that there were notches on the lines pointed out. The children were told that they were to refer to the length of the lines as " one-notch," " two-notch," or " three-notch " lines respectively.

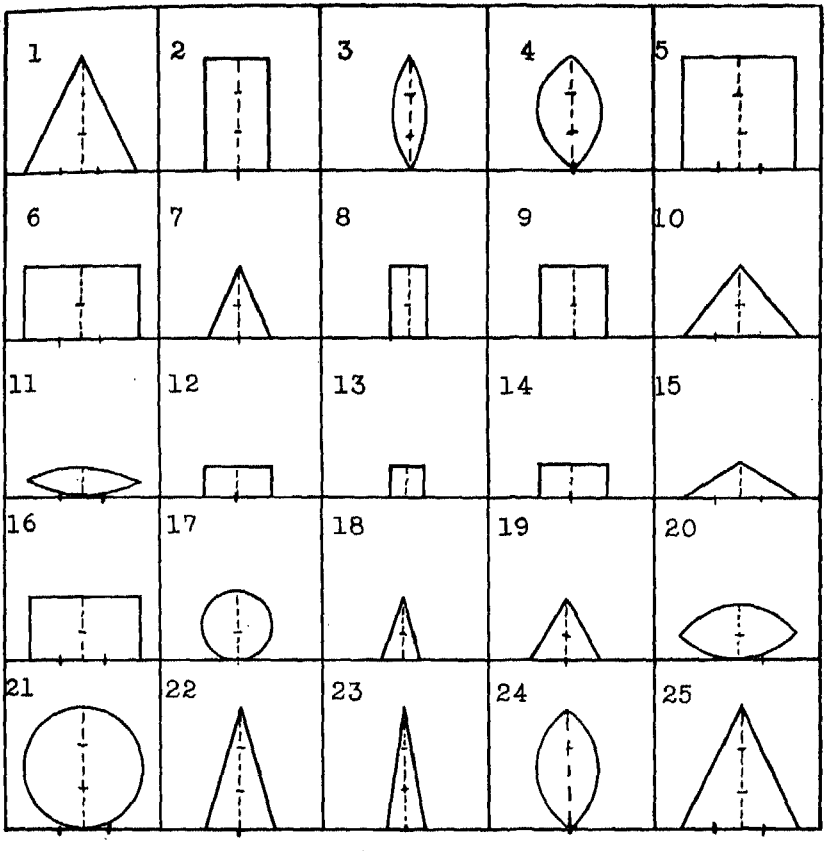


FIGURE 1.

The procedure from this point differed according to the method being employed. Those being taught by the first method were told that it was a puzzle. They were to try and find out the " laws " governing the height of the figures and the length of the base lines.

Those who were being taught by the second method were given the formulation of the " law." They were told to see whether they could apply it, in finding the answers to the questions, which were to follow. The formulation given was : " The figures get taller as you go up or down from the centre row ; and the base line increases as you go to the left or right of the centre column."

Those taught by the third method had the law given to them and then explained by reference to another figure drawn on the blackboard.

When the teacher was quite sure that the principle was thoroughly understood, the second part of the lesson commenced.

The children were now referred to the duplicated sheets and the squares covered up one at a time in a selected order. Their reaction consisted of filling in blank spaces, the height and width (in notches) of the figures covered up. The questions were not confined to any particular type, but were varied in nature. Some were of the straight out question and answer type, others were in the form of analogies, some consisted in sets of five columns or rows and so represented an added difficulty. The last question was regarded as being the hardest of the tests. It consisted in asking the children to draw rectangles in the blank squares, such that the height and width were governed by the same laws as those in the chart. It was really a formulation of the relationship in concrete terms.

For the " b " methods the testees had the answer indicated to them for a portion of the experiment (called in Tables 2 and 3 the " prevention-of-error period ").

The second concept consisted in a similar diagram (Fig. 2), but the concept to be developed was the relationship between the positions of the figures and the length of the base line. The methods used were similar to those adopted with the first concept. It will be noted that the height of the figures was continually changing and followed no particular law. This was for the purpose of making the concept harder to develop. In this diagram the length of the base increased in an outward direction from the left bottom square as the starting point.

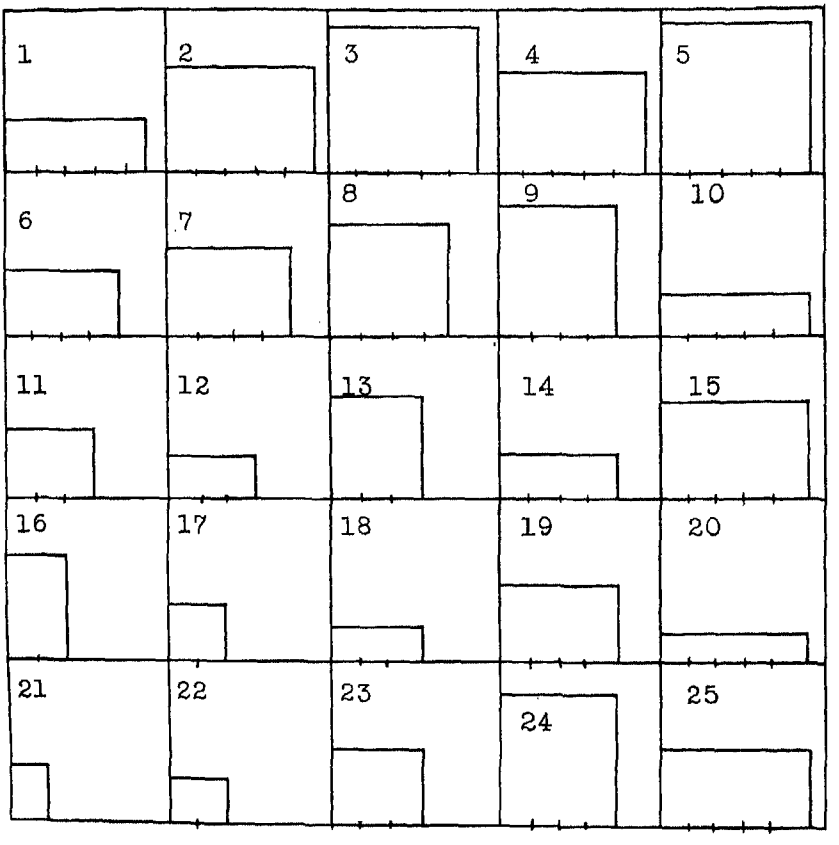
The formulation of the law, in words, was harder in this test than the last one, that given to the children for the second and third methods being :

" Starting from the left bottom square (No. 21), figures in all squares bordering on this one (three in number) have figures with longer bases than the one in No. 21. Similarly any squares touching these three squares, in an outward direction, have longer bases than the ones already mentioned and so on throughout all the squares."[1]

As before the test questions were of varying kinds and entailed a simple reaction, such as the putting of a number in a blank space on the test sheet.

The third artificial concept was constructed on an entirely different plan. In essence it consisted in the discovery of the relationship governing

the handing down of colour blindness, as discovered from a number of genealogical tables given to the testees. It possessed one advantage over the other concepts in that it allowed of more opportunity during the earlier stages of the learning of making incorrect generalizations, and, since the possible answers were very greatly increased, the liability to make false individual judgments was also enhanced.



ksp 2.

FIGURE 2.

It had another advantage over the other two tests, in that it allowed of the development of the general idea passing through different stages of complexity, much as the development of the idea of an adjective does.

This time there was no chart used. The testees were handed duplicated sheets, which served both as test papers and as chart.*

* Typical questions were as follows :

(I) Below you will find an example and some questions. Look at the example and then put a cross against all those persons in the questions who, you think, will be colour blind.

Example.	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)
S*	S*	D	S*	S*	S*
D	D	S*	D	D	D
S*	S	D	S	S	S
D	—	S	D	D	D
S*	—	D	S	S	S

(In the above, S stands for " son " and D for " daughter," and the stars represent a colour-blind person.)

(II) Answer the following questions by underlining the right answer.

(1) A colour-blind man has a daughter. Would she be colour-blind? Always? Never? Sometimes?

(2) The daughter of a colour-blind man had a son. Would he be colour-blind? Always? Never? Sometimes?

(3) The daughter of a colour-blind man had a son John, and John had a daughter Mary. Underline the correct statement below :

(*a*) Mary was colour-blind.

(*b*) Both were colour-blind.

(*c*) Neither was colour-blind.

(*d*) John was colour-blind.

Etc.

The test was given in several sections, as already indicated, the examples at the beginning of each section being :

S*	S*	S*
D	S	D
S*	D	D
D	S*	S*
S*	S	D
D	S	D
S*	S	D
	S	D
	D	S*
	S*	

It will be seen that the first batch was so framed that the inference to be drawn was that all the sons were colour-blind and that the girls were not. The second introduced the further complication that some of the sons were now seen to be free from the defect. The inference to be drawn was that it was only the son immediately following a daughter who was colour-blind. The third batch introduced the still further complication that no matter how many daughters came in between, the defect was handed down to the first son who came along.

In the "diagrammatic" tests the fundaments were always an "S" or a "D," and, in this respect, i.e., in their unchanging nature—were less like the situation found in the adjective-noun relationship than was desirable. But in the other type of question it was possible to vary the fundaments by the words "man," "father," and "son" for the "S" of the genealogical trees; and in the case of the "D" by the words "mother," "woman," "girl," etc. A further variation was possible by the substitution of actual names. In this way it was possible to get situations sufficiently varied and complicated to be comparable with those found in the grammatical relationships with which the research started.

As the perception of the relationship between a noun and an adjective, or that between a verb and adverb, consists in the eduction of a relation between two fundaments of a certain definite character, so, in this case, the task set the child was the eduction of a relationship between fundaments which varied in non-essentials while remaining stable in essence.

The administration of the tests was along the same lines as in the previous cases. The formulation for the second and third methods was as follows:

> "No daughters are colour-blind. Colour-blindness is handed down from a colour-blind man through a daughter to her son."

III.—THE RESULTS.

(*a*) *The First Concept.*

The scores for the first concept are shown in Table II. It will be noted that the prevention-of-error period is tabulated in the first column. Then follow the errors, the pure score, and the score less errors. It is the latter which is taken to be the best measure of the efficiency of the concept, and chief attention will therefore be paid to this score.

The results show that the plain inductive method (1a) came out the worst of the lot. The method in which the concept is just given (2a) proves to be better than "1a"; while the method in which the formulation of the concept is carefully explained (3a) tends to be slightly better still. Another interesting point is the difference shown between the results of the "a" and "b" methods. Between "1a" and "1b" there is a difference of 8·96 in favour of the "b" method. This difference, however, is reversed for methods "2a" and "2b," where there is a loss for the latter of 5·55. In the third method there is a gain for the "b" of 5·1.

TABLE II.

SHOWING AVERAGE SCORES BY DIFFERENT METHODS WITH STANDARD DEVIATIONS AND PROBABLE ERRORS.

The First Concept. (Group =41.)

	Prevention of Error Period.	*Portion used as Test* (*Score*=86).		
Method	*Possible*=40.	*Errors.*	*Pure Score.*	*Score less Errors.*
1a	Av. =21·65 Sigma = 4·48 P.E. = 3·02	6·61 4·36 2·94	44·83 9·57 6·45	38·24 11·59 7·82
1b	Av. =34·66 Sigma = 8·30 P.E. = 5·60	5·70 4·27 2·87	52·90 11·80 7·95	47·20 12·66 8·53
2a	Av. =24·17 Sigma = 7·12 P.E. = 4·78	5·15 3·67 2·48	53·90 16·64 11·20	48·80 18·70 12·60
2b	Av. =34·40 Sigma = 5·02 P.E. = 3·38	5·54 5·78 3·90	48·81 13·10 8·95	43·25 17·10 11·50
3a	Av. =26·26 Sigma = 6·42 P.E. = 4·32	5·90 4·80 3·70	55·80 14·73 9·93	49·90 18·37 12·38
3b	Av. =33·10 Sigma = 6·14 P.E. = 4·14	6·10 5·44 3·66	61·09 13·15 8·86	55·00 17·05 11·50

The question arises as to whether these results are significant. To discover this use was made of the following formula* :

$$\sigma^2_{\bar{\chi} \backsim \bar{\gamma}} = \frac{2\sigma^2}{n}\left[1 - r_{de}\right]$$

It now appears that the difference between " 1a " and " 2a " is much more than would be expected by chance. Similarly, the difference between " 1a " and " 3a " is significant. That between " 2a " and " 3a," however, turns out to be merely what we should expect to find by chance.

Turning now to a comparison between the "a" and " b " methods, we discover that there is a quite significant difference between " 1a " and

* For detailed development of the formula see the appendix.

" 1b." The difference between " 2a " and " 2b " is not quite twice the probable error as shown by the formula, while that between " 3a " and " 3b " is shown to be similarly insignificant.

An analysis of the errors committed disclosed that in every case, without exception, they were due to reproduction taking the place of the required correlate eduction.* This result confirms the conclusions of Stevanovic (No. 10), Strasheim (No. 11), and Laycock (No. 12).

It appears from the results already quoted, that whereas method " 1a " is the worst of the lot, yet method " 1b " proves almost as effective as " 2a " and " 3a." Accordingly it looks as though the method of preventing mistakes might be a powerful ally of the teacher of the future. So far from its being true that we learn by our mistakes, it seems to be rather the reverse. We learn best when prevented from making them. The effect of the " b " method, in the case of methods 2 and 3, is less than in the case of the first; and this is what one might expect, for these methods give an insight into the general relationship, and the children are therefore attacking the problems with this additional knowledge to help them. But it is too early to speculate further, and the application of the results to teaching practice will be reserved for later discussion.

An interesting point is the fact that the methods appear to affect children of different grades of intelligence in similar fashion. To ascertain this, the children were divided into sub-groups according to intelligence as shown in Spearman's test, and their results in our test compared.

Throughout the test the children had opportunities of formulating the concept, in words, as soon as they were able to do so. These formulations showed that there was no correspondence with the scores, a result which corroborates that of Hull (No. 4, page 44).

(*b*) *The Second Concept.*

The scores for this concept, which are shown in Table III, show a curious reversal of the results for Concept I. This time all the " b " methods have turned out less effective than the " a," whereas in the previous test only method " 2b " has scored less than its corresponding " a " method. To what is this result due? It is probably due to the difficult nature of the concept and the necessarily wordy formulation of the law. It appears that the wordy formulation has actually hindered the functional efficiency of the concept. The educational bearing of this result is obvious, and important.

* For a detailed account see the full thesis in the Library of the University of London.

It will be remembered that in the administration of the " b " methods the teacher did not help the children by telling them the right answer, but by pointing out cases where a similar base was found. In the last concept this led rather more easily to the perception of the relationships required. In the second case this was not so, for the relationship itself was rather more complicated. It seems quite feasible that whereas the pointing out of similar examples may have assisted the perception of short relationships " (i.e., those between individual examples), yet it may not have helped the development of the general or " higher relationships." That this was actually the case was shown by a comparison of those questions depending more specifically on the knowledge of the general law and those involving " short relationships."

TABLE III.

SHOWING AVERAGE SCORES BY DIFFERENT METHODS WITH STANDARD DEVIATIONS AND PROBABLE ERRORS.

The Second Concept. (Group=41.)

	Prevention-of-Error Period.	*Portion used as test.* (*Score*=70)		
Method.	*Possible*=30.	*Errors.*	*Pure Score.*	*Score less Errors.*
1a	Av. =26·07 Sigma = 4·78 P.E. = 3·22	4·17 3·61 2·43	56·07 12·16 8·20	51·90 15·10 10·17
1b	Av. =28·50 Sigma = 1·71 P.E. = 1·15	6·48 4·07 2·72	51·00 14·59 9·83	44·56 17·70 11·92
2a	Av. =24·70 Sigma = 5·90 P.E. = 3·98	5·55 4·07 2·74	49·60 14·40 9·70	44·02 17·42 11·74
2b	Av. =22·40 Sigma = 6·54 P.E. = 4·50	6·05 3·80 2·53	40·80 12·00 8·08	34·75 13·88 9·35
3a	Av. =28·40 Sigma = 2·86 P.E. = 1·92	2·05 2·43 1·64	61·40 10·60 7·10	59·30 12·12 8·17
3b	Av. =28·64 Sigma = 2·05 P.E. = 1·38	2·93 3·60 2·42	59·60 12·54 8·45	56·60 15·76 10·62

One further point needs looking at, however. If the scores for the " prevention-of-error period " are examined a remarkable fact emerges. For, even here, the results of the " a " and " b " methods are hardly distinguishable. This clearly shows that the " b " methods were ineffective, not because of an inherent weakness in the method itself but because it had not been effectively applied. It was intended to prevent mistakes, and it turns out to have prevented no more than the " a " method. It is plain, therefore, that the " b " method has not been applied at all. Hence it is not surprising that there is no improvement in the scores as compared with the " a " methods.

We have still to explain why it is that there is actual diminution in score for these methods. It is probably due to the fact that in the one case (the " a " methods) the children were searching more actively for the relationship required, whereas in the other (the " b " methods) they were relying on the experimenter, and, because it had seemed difficult at first, not making enough effort. If this were the explanation, we should expect to find that " 2b " was much worse than " 3b " in relation to " 2a " and " 3a " respectively. And this is just what the result shows.

When the results in Table III are investigated, by use of the special formula, several points become at once apparent. Method " 1a," for instance, is shown to differ from " 2a " by an amount which is negligible, whereas it differs from " 3a " by an amount which is almost three times that to be expected by chance. Of these two results the former is of great importance for education. Experienced teachers know how fatally easy it is to be content with giving a form of words, and inferring that their implication is understood. This result has gone to show that not only is the giving of words (in some cases) not helpful, but that sometimes it may be actually harmful. To be effective, all formulæ should be shown in their setting, and from the beginning referred to the facts.

Now to return to the question of the differences between the " a " and " b " methods. The apparent falling off in the case of " 1b " is just over twice the probable difference. It can, therefore, only be regarded as an indication. But we have already seen that the real value of the method, viz., the preventing of mistakes, was inoperative in these cases, and that the differences were due to another factor—the inertia of the children in the face of a difficulty greater than usual. The reliance on the experimenter has, then, tended to prevent the active search for the relation.

The difference between methods " 2a " and " 2b " is found to be significant. But it must be significant of something other than the

inherent nature of the "b" method. And we have seen that it is, in all probability, due to the factor mentioned above.

The falling off in method "3b" is shown to be only what can be expected from mere chance.

One further point should be noted, namely, that the difference between "2a" and "3a" is five times what would be expected from chance; a fact which emphasizes the necessity for the thorough explanation of all general relationships (or concepts) when they are given to children.

An attempted analysis of the errors as in the case of the first concept met with a disappointing result. It was found that they could not be classified. This was probably due to the fact that the task was so difficult that it led merely to random trial-and-error attempts.

As before, the effect of the methods on all grades of intelligence was similar, except that the duller children appeared to be affected rather more than the better endowed pupils.

The formulation of the concept in words again appeared to bear no relation to the functional efficiency of the concept as measured by other means.

(*c*) *The Third Concept.*

Since there were more opportunities of going wrong, from the beginning, the results have been tabulated, showing errors made during the "prevention-of-error period," as well as afterwards. The results are shown in Tables IV and V.

It is immediately apparent, from a consideration of these tables, that method "1a" is the worst of the lot. Moreover, it has been responsible for many more errors than any of the other methods. Method "2a" appears to have done slightly better than "3a," but the difference is not significant. It looks as though the mere telling of the relationship in this case has been as effective as the telling plus explanation. And this is not to be wondered at, since the formulation of the relation is such that it can be readily understood.

It will be further noted that in every case the "b" method has triumphed over the "a." This, it will be seen, is complementary to the fact that the "b" method has on this occasion been successful in preventing errors, a fact which is quite plain from Table VI. There it will be seen that method "1a" has been responsible for an average of six errors and a "pure score" of 18. The corresponding "b" method, however, while only producing an average increase of 1·7 "pure score," was responsible for the almost total elimination of the errors.

TABLE IV.

SHOWING AVERAGE SCORES BY DIFFERENT METHODS WITH STANDARD DEVIATIONS AND PROBABLE ERRORS.

SCORES DURING "PREVENTION-OF-ERROR PERIOD."

The Third Concept. (Groups=41.)

Method.	*Errors.*		*Pure Score.*	*Score less Errors.*
1a	Av. =	6·0	18·0	12·0
	Sigma =	3·75	2·1	4·79
	P.E. =	2·52	1·42	3·23
1b	Av. =	0·07	19·7	19·8
	Sigma =	*	0·02	0·57
	P.E. =	*	0·01	0·38
2a	Av. =	3·05	19·70	16·66
	Sigma =	4·78	0·59	5·04
	P.E. =	3·22	0·39	3·38
2b	Av. =	0·0	19·8	19·8
	Sigma =	*	*	*
	P.E. =	*	*	*
3a	Av. =	4·95	18·8	13·85
	Sigma =	5·87	1·78	6·97
	P.E. =	3·95	1·2	4·7
3b	Av. =	0·3	19·6	19·9
	Sigma =	*	*	*
	P.E. =	*	*	*

* In the "b" methods, where blanks are left, it was obviously unnecessary to work out the result.

TABLE V.

SHOWING AVERAGE SCORES BY DIFFERENT METHODS WITH STANDARD DEVIATIONS AND PROBABLE ERRORS.

SCORE DURING THE TEST PERIOD.

Third Concept. (Groups = 41.)

Method.	*Errors.*		*Pure Score.*	*Score less Errors.*
1a	Av.	= 18·90	67·70	51·30
	Sigma	= 16·15	13·29	26·40
	P.E.	= 10·88	8·95	17·80
1b	Av.	= 8·27	77·35	68·90
	Sigma	= 14·00	9·60	19·60
	P.E.	= 9·44	6·47	13·42
2a	Av.	= 5·27	81·14	75·87
	Sigma	= 11·61	7·90	19·00
	P.E.	= 6·80	5·34	12·80
2b	Av.	= 0·41	85·04	84·63
	Sigma	= 1·30	2·90	3·48
	P.E.	= 0·88	1·96	2·35
3a	Av.	= 5·22	80·50	75·40
	Sigma	= 9·09	8·26	14·46
	P.E.	= 6·1	5·57	9·75
3b	Av.	= 1·92	81·14	79·22
	Sigma	= 3·92	6·88	9·59
	P.E.	= 2·64	4·64	6·43

Similarly, while method " 2a " produced an average of three errors, the corresponding " b " method produced no errors at all.

The same is true if a comparison between " 3a " and " 3b " is made. The former has produced an average of nearly five errors, whereas the latter has been responsible for an average of 0·3.

But this is not all. If reference is made to the scores during the testing period, it will be seen that in all the " a " methods the errors continue to be made after the "prevention-of-error period" is passed. Thus the errors for method " 1a " show an average score of 18·9 ; those for method " 2a " an average of 5·57 ; and those for " 3a " an average of 5·22.

The figures for the corresponding " b " methods are 8·27, 0·41, and 1·92. It looks, therefore, that the effect of the " b " method is felt throughout the experiment in the reduction of the errors committed. In

view of the fact that greater opportunity of making errors was allowed in this experiment, and bearing in mind also that, in this respect, this test approximates the conditions obtaining in the grammatical concepts, this result would seem to be of great practical importance. When the results are examined in the light of the formula very clear differences are shown in the methods. For instance, the difference between " 1a " and " 2a " is nearly four times the difference to be expected from chance ; while that between " 1a " and " 3a " is over five times the chance variation. The difference between " 2a " and " 3a " is practically nothing. And this is what might be expected from the nature of the formulation of the concept. Where there is more or less complete understanding the differences between " 2a " and " 3a " must be very small.

This table shows, too, that the differences between " 1a " and " 1b " is significant ; while that between " 2a " and " 2b " is over five times the difference as shown by the formula. Between " 3a " and " 3b " the difference is again negligible.

It is interesting to note that this is the only case where method " 2b " has proved better than " 2a." Can any reason be suggested for this ? In the case of the second concept we have seen that a probable explanation of the failure of the method was the fact that it was not properly given. But how can its failure in the first test be accounted for ? There, judged by the score before the " prevention-of-error period " ceased, the method had been effectively given. To be sure the errors recorded during the " test period " were a little more numerous by the " b " method, though the amount was negligible. It looks, there, as though the added explanation given for the method " 3a " affected the score as little as it did for the same method in the third test. All the factors seem to be equal in the two cases, and yet there was a difference in the result.

An examination of the standard deviation of the score during the " prevention-of-error period " shows that the method had not yielded such a uniform result for the first concept as for the present one. In the former case the standard deviation was over five, whereas in the latter there was no variation at all (showing that the method had been completely effective). This, then, seems to be the factor which was needed to explain the difference. When the method is really effective it gives a better result ; where it is not effectively applied the result is negative.

Classification of the errors, for this concept, proved relatively easy. In practically every case they were caused by noting certain short relationships, such as, for instance, the idea that every second person was colour-blind, a relationship that did hold in the first series of examples,

and then simply carrying over these relationships to the new cases where they no longer applied.

Now, the division of the examples into types, a common teaching device, actually aided this process. Reproduction is an easier process than correlate eduction, and accordingly we find, again and again, even after the testees' attention had been called to the new type of example at the side of the new set of experiments, the mere reproduction of the old taking the place of the harder work of making new correlate eductions. Here we find its own condemnation of the current practice—and the one adopted in the test—of dividing up new material into sections, the succeeding ones of which introduce more complications where the student has not previously been warned that this is not the whole of the relationship required.

It would seem better to present all the different types of examples to him at the one time, so that he can get a general survey of the whole ground before attacking any particular type.

If this is not done, there is grave danger when the new material is attacked of the effect of reproduction coming in to the detriment of the learner. The old way has commenced to form a habit of response, and this habit functions in preventing, or tending to prevent, the introduction of new material.

This shows the fallacy of the attempt to present material in a "logical form" without consideration of the psychological needs of the learner. The aim in all instruction would seem to be: "Make your reproductive tendencies your ally instead of your enemy. At all costs prevent the formation of impressions which have to be altered later on." In other words, "Prevent mistakes."

The results show that where the whole relation has been given, and the attention thus directed to what holds good throughout the experiment, the number of mistakes, due to the influences we are discussing, are greatly decreased. Further, we have seen that where, in addition, we have the further principle of the prevention of mistakes by guidance for a certain period (even a small one), the mistakes in the whole succeeding experiment are still further reduced.

As with the two previous concepts the methods affected all grades of intellect alike, with the proviso, however, that they appeared to affect the less intelligent rather more than the others.

Ability to formulate in words differed, in this test, in that there did seem to be a relationship between it and the functional efficiency of the concept. We must, therefore, modify our previous opinion on this point and say that ability to formulate in words shows no necessary connection

with the functional efficiency of the concept, but that sometimes there is a fairly close relationship.

The results for this experiment have on the whole confirmed those obtained for the first. They have resulted in our concluding that the "deductive" methods are very much superior to the inductive one. Moreover, this test has shown that where the possibility of making errors is increased there is a wider range of difference in the results due to the methods. Where mistakes are prevented from occurring there is a distinct advantage, as shown in the resulting scores. The "b" methods have been shown to have been effective throughout the experiment, and have vindicated their superiority.

(*d*) *Application to Grammatical Material.*

In order to discover whether the conclusions, obtained from the three artificial concepts, held for actual school material, six grammatical concepts—the adjective-noun, adjective phrase-noun, adjective clause-noun, adverb-verb, adverb phrase-verb, adverb clause-verb relationship were taught to groups equated for intelligence and grammatical knowledge by the same methods. Considerations of space prevent a detailed account of these results,* but it will be sufficient to say here that they confirmed in general the conclusions arrived at, and proved that the results obtained with our artificial material held for the ordinary class-room work.

IV.—GENERAL SUMMARY AND CONCLUSIONS.

We have seen that, where the chances of going wrong are many, the "b" method is easily better than the "a." But many school subjects are of this nature, and it would appear that the use of this method in school would save a number of false associations being formed, and so prevent the reproductive tendency from working in opposition to the learner.

Now, in our experiments, errors were prevented for a short time only, and it seems likely that if this help were increased in each lesson, or continued over a number of lessons, the effect might be cumulative.†

One caution should be offered, however, in view of the results of the second test. It is possible, in the administering of this method, to stultify the activity of the children and substitute for it a mere reliance on the teacher. If such dependency is wholly mechanical, if it is not shot through with insight, the result may be worse than that obtained without the help.

* For the detailed results the reader is referred to the thesis in the Library of the University of London.

† This was actually the case with the grammatical concepts.

The assistance should be given in such a way that the child understands why this way is right, or at least is put plainly in the way of understanding it. If the task is too difficult this position of dependency is facilitated.

Now in the different tests a slightly varied manner of giving the " b " method was adopted. In the case of the second, for instance, the experimenter pointed out cases where the lengths of the lines were similar. In the case of the third, the children, by suggesting the correct answer, were able to enter more actively into the search. The results were distinctly in favour of the adoption of the latter method, a confirmation of what has been said above about the importance of avoiding dependency of a mechanical nature.

Our results suggest as a profitable line for further research the following up of this problem of the prevention of errors.

There is still the interesting question of the relative efficiency of the main methods to be considered. There is a plain verdict in favour of the mere telling—a simple deductive method. Between the second and third method there is still a balance in favour of the latter.

This result confirms that of Hull (No. 4, page 44), and that of Winch (No. 5).

In view of this unequivocal result there seems to be no doubt as to which is the best method to teach new material when immediate efficiency is required. No. 3 has shown itself to be far superior to any other. The efficiency of the second method depends on the degree to which the formulation is understood by the pupils. If it is understood, then the result is approximate to that obtained by the third.

The results of the whole series of experiments have shown that the deductive method of teaching, where there is explanation of the relationship to be taught and immediate reference to particular cases, is much better than the inductive one.*

With quite new material, indeed, the first (inductive) method comes out very badly, and yet this is the one most universally approved.†

* The weakness of the usual deductive method seems to have been that the main attention has been given to the formulation of the law or relationship and the reproduction of this formulation, *in words*, by the children. But both the researches of Hull (No. 4), and this one, have shown that there is no necessary connection between ability to define and ability to employ in concrete cases. The efficiency of the concept is best developed and judged by the ability shown in applying it to concrete cases.

† The grounds for this approval seem to be the idea that this is the most " natural " method of learning ; but there is some reason to doubt this. It may be the natural manner in which a dog learns to develop the concept " bone," but the human infant is endowed with the capacity of speech. This leads him to enquire for information, verbally, and to delight in the added power which such knowledge brings. His pleasure in the discovery of new knowledge is, in the writer's opinion, quite equalled by his enjoyment in applying knowledge obtained deductively.

The second method (simple deduction) has been shown to be the most variable. In some cases it works but in others appears to make confusion worse confounded. Particularly is this the case where the formulation of the relationship is obscure, or only partially understood by the children. Moreover, because of the fatal facility with which children (and adults) will reproduce mere words, the lack of functional efficiency may pass unnoticed, with disastrous results to learning ability.

In addition to these three main methods a further modification of them was made by assisting the child for a certain portion of the experiment, and thus preventing him from making mistakes.

The results of this modification were generally slightly in favour of the " helping " methods, this being particularly the case with the inductive one. Where no other help is forthcoming, it does seem a good plan to guide the child's early attempts and prevent him making errors. But this should be done " with insight," if the method is to be effective. Such a method brings the reproductive tendency on the side of the learner.

The method does not seem to be effective if it does not succeed in getting the child to educe the " higher level relationships." These higher level relationships will frequently have to be pointed out to the child, for they are not readily seen when he is unaided.*

For this reason grammar appears to be a very difficult subject for the children of this age. The higher relations involved are not readily seen and the subject matter itself proves of little interest.

Besides the general pedagogical implications of the above findings there is the particular one, that, in teaching, when the difficulty of the subject matter *is* within the grasp of the children, care should be taken that any higher level relationships involved are pointed out during the lesson. The failure of the first or inductive method in our experiments seems to have been due to the lack of this knowledge, and the task of the teacher would appear to be to present his subject matter in such a way that the wider implications involved are kept throughout in the forefront.

It has been claimed in favour of the inductive method that it trains the child to deal with new subject matter in a more effective manner than the deductive. This experiment has not investigated this point, but it points a profitable line for further research, to discover whether the application of our third method, with its insistence on the higher level relations, would not yield better results than those already obtained from the inductive method.

* Dr. Laycock discovered the same fact in his recent work (No. 12).

On these lines, this research has opened up new fields for future investigation, and in this respect, if in no other, may, it is hoped, be of profit and assistance to pedagogy generally.

Appendix.

Formula for finding probable error of difference between means of samples from schools x and y.

Let $x_1=m+d_1$, where m indicates means of whole population.
,, $x_n=m+d_n$
,, $y_1=m+e_1$
,, $y_n=m+e_n$

Then $\bar{x}-\bar{y}=\Sigma(x)/n-\Sigma(y)/n=\frac{1}{n}\left[\Sigma(x)-\Sigma(y)\right]$

$$=\tfrac{1}{2}\left[nm+\Sigma(d)-nm-\Sigma(e)\right]$$

$$=\frac{1}{\text{II}}\left[\Sigma(d_p-e_p)\right]$$ where d_p and e_p are any two boys that have been paired for "g" and Σ denotes summing within sample.

Hence

$$\sigma^2_{\bar{x}-\bar{y}}=\frac{1}{N}\frac{1}{n^2}S\left[\Sigma(d_p-e_p)\right]^2$$ where S denotes summing of samples

But $$\left[\Sigma\ (d_p-e_p)\right]^2=(d_1-e_1)^2+\ldots.\ (d_n-e_n)^2+2\Sigma\Sigma(d_p-e_p)(d_q-e_q)$$

$$=\Sigma(d^2)+\Sigma(e^2)-2\Sigma(d_pe_p)+2\Sigma\Sigma(d_pd_p)-4\Sigma\Sigma(d_pe_q)$$
$$+2\Sigma\Sigma(e_pe_q)\ \ldots\ (1)$$

We have now to sum each of these terms for all samples.

$$S\left[\Sigma(d^2)\right]=S(d_1^2+\ldots.\ d_n^2)=S(d_d^2)+\ldots.\ S(d_n^2)$$
$$=N\sigma_1^2+\ldots.\ N\sigma_n^2=N_n\sigma^2$$

And similarly

$$S\left[\Sigma(e^2)\right]=N_n\sigma^2$$

$$S\left[\Sigma(d_p e_p)\right] = S\left[d_1 e_1 + \ldots . d_n e_n\right] = S(d_1 e_1) + \ldots . S(d_n e_n)$$

$$= N\sigma_{d_1} \sigma_{e_1} r_{d_1 e_1} + \ldots . + N\sigma_{d_n} \sigma_{e_n} r_{d_n e_n}$$

$$= N\sigma^2 \left[r_{d_1 e_1} + \ldots . r_{d_n e_n} \right] = Nn\sigma^2 r_{de}$$

$$\therefore \sigma^2_{x-y} = \frac{2\sigma^2}{n}(1 - r_{de})$$

But the children have been "equalized" by means of their "g" score in the manner already described. And d and e are only correlated because of this correlation with the "g" score.

$$R_{de \cdot g} = \frac{r_{de} - r_{dg} r_{eg}}{\sqrt{1 - r^2_{dg}} \sqrt{1 - r^2_{eg}}} \quad \text{so that } r_{de} = r_{dg} \cdot r_{eg} = r^2_{(d \text{ or } e)g}$$

NOTE.—The other r's in (1) will cancel out since the d's and e's are not from mean of sample but from m.

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RÉSUMÉ.

LE DÉVELOPPEMENT DES CONCEPTS.

La plupart des éducateurs affirment qu'en enseignant un concept il faut commencer par les idées particulières pour arriver à des généralisations. Pour mettre à l'épreuve la vérité de cette affirmation dans les cas des rapports grammaticaux adjectif-nom, adverbe-verbe, on inventa trois concepts artificiels comprenant ce rapport et chacun des trois fut enseigné par les trois méthodes suivantes :

(1) Des idées particulières à la généralisation.
(2) De la généralisation aux applications particulières.
(3) Comme dans 2., mais avec quelques explications au moyen des allusions aux applications particulières.

En outre, on tenta l'expérience d'aider les sujets de façon à les empêcher, autant que possible, de commettre des erreurs. La meilleure méthode se trouva être le numero trois—méthode qu'on pourrait appeler composée. La séconde se montra le plus variable. Lorsque la manière de formuler le concept n'était comprise qu'en partie, la méthode ne produisait que de mauvais résultats.

Les moyens adoptés pour éviter les erreurs n'étaient avantageux que lorsqu'ils n'empêchaient pas les sujets de déduire les " rapports de niveau supérieur."

ÜBERSICHT.

DIE ENTWICKLUNG DER BEGRIFFE.

Wenn man Unterricht in einem Begriff gibt, sollte man von Einzelheiten zu Verallgemeinerungen führen, behaupten die meisten Erzieher. Um die Stichhaltigkeit dieser Behauptung im Falle des Sprachverhältnisses „ Adjektiv-Substantiv " und „ Adverb-Verb " auf die Probe au stellen, wurden drei künstliche Begriffe erfunden, die dieses Verhältnis umfassen, und jeder wurde auf die drei folgenden Arten gelehrt.

(1) Von Einzelheiten zu Verallgemeinerungen.
(2) Von Verallgemeinerungen zu Einzelheiten.
(3) Wie 2. aber mit Erläuterung der Einzelheiten.

Ferner versuchte man die Folgen zu entdecken, wenn man den Personen womöglich half, damit sie keine Fehler begingen. Es ergab sich, dass die dritte oder zusammengesetzte Methode die beste war. Am veränderlichsten war die zweite; wenn die Formulierung des Begriffes nur zum Teile verstanden wurde, schadete sie nur. Die Hilfsmittel, die Irrtümern vorbeugen sollten, waren vorteilhaft, nur wenn sie die Personen nicht hinderten, die „ Verhältnisse des höheren Niveaus " hervorzuziehen.

ON THE DISCERNMENT OF THE DISCIPLINARY VALUE OF STUDIES

(Contributed to a Symposium of the British Association, September, 1930.)

By HELEN WODEHOUSE.

I.—*The necessity of analysis of individual experience as a supplement to experimental and statistical investigation.*
II.—*Subjective analysis, as a means to counteract traditional dogmatism.*
III.—*Subjective analysis as a means of revealing injuries as well as benefits, and antagonism or goodwill.*
IV.—*Subjective analysis limited to conscious changes.*
V.—*Summary of conclusions.*

I.

Workers in the science of education must often envy their colleagues in the physical sciences. It is possible in chemistry (I gather from science graduates) to make a mixture and know everything that is in it; to add one more constituent and know exactly what we add; and to measure the effect and know what has produced it. How far we remain from so happy a position when we add two years' study of Latin to the make-up of a boy! How distant we are, in England at any rate, even from the biologists with their multiplied observations. In the happier States, Professor Thorndike's typical reports have still to end, "A repetition of this experiment with 16,000 or 18,000 more cases is needed before final conclusions should be stated."

Experiments must continue and statistics must be multiplied; nobody doubts this or deprecates the need. But, pending this indispensable work, and even as a possible source of guidance for it, another method does remain; a method of which the chemists and biologists cannot avail themselves. It is out of favour with recently dominant schools of psychology, yet the object of this paper is to advocate its retention and development. It consists simply of observation and analysis by individuals, especially of that experience which it is most open to them to observe—their own experience in a not-too-distant past.

II.

"I first learnt to appreciate the value of well-arranged work," writes one of my students, "from a study of geometry. If before starting a geometrical rider, I stated all the given facts and then that which it was required to prove, it was a much simpler task than if I had tried to muddle through the proof without clearly stating what I knew to be true. I remember trying to see whether I could get better results in my history and geography by applying a similar method of working."

"When I entered the secondary school," says another, "my work suffered from untidiness. Blots appeared without my will, and the general arrangement was poor. In mathematics neatness was urged as a quality essential to good work; methods of spacing and of accommodating analyses on the page were suggested, and examples of beautiful work displayed. This led to a clarification of my ideas. I gained a visual image of what a page of neat work meant, and this gave me a standard with which to compare my own attempts. From that time all my written work improved from the point of view of a pleasing arrangement, giving me a sense of all-round progress."

And one other, speaking of the same ideal of neatness, says: "I think I was given it through arithmetic, about thirteen years ago, and I have carried it before me ever since, and now I simply hate untidiness of any kind." I preserved this third statement with special care, because it was contained in one of the untidiest essays that I have ever received.

Most certainly we shall not put forward this method as infallible. But we may hold that an amateur method, provided it is bound to definite points, has initial advantages as a check on the real danger, which is amateur dogmatism. In a summer school class discussion I have heard a teacher of orchestral music claim many disciplinary advantages for his subject; for instance, that it trained its students to obey a leader and to join in at the appointed moment and leave off at the appointed moment. I do not know of any controlled experiment or authoritative figures by which we could have checked the claim, and I see little prospect of such figures being collected for many years to come. But a candid friend in that class might have brought it to the speaker's notice that, in this discussion, where each member was asked to limit himself to fifteen minutes, he had taken forty-five minutes and had to be almost forcibly made to sit down. It might, at any rate, have prevented him from giving us another twenty minutes next day. So when a young teacher in training is disposed to claim large effects for his own subject, we may ask, without offence, "Can you trace these effects in

your own experience? If so, can you give details? If not, can you explain?" And we may obtain quite useful answers.

"While studying for a French Honours degree I became thoroughly impregnated with the French spirit of method, thoroughness, and accuracy. The love of accuracy (expressed in attempts to discover the exact word or phrase) and of logical classification has certainly spread to other subjects, and to other activities of daily life." (I have noticed that this is a frequent testimony from those who have come under the influence of my colleague Professor Boillot. I cannot imagine its being given by those who have learnt French only from certain other teachers I have known. I am sometimes inclined to think that, selecting your pupil and your teacher, you could obtain almost any value from any subject.)

"It is claimed that if a person, through constant use of delicate glass vessels, highly sensitive galvanometers, etc., learns to treat them gently and carefully, he will also treat the egg-shell china and wireless set at home with similar care. This, I think, is, on the whole, true. I know that, naturally, I am extraordinarily clumsy in the use of my hands, and yet it is very seldom that I break anything when washing up or dusting at home." But another student comments on this: "I have recently been talking to a man who took his degree in chemistry and physics, and he says that after working with really delicate apparatus even the finest of the family possessions seemed coarse, with consequent sad results. In my own case I cannot detect any difference between my treatment of everyday utensils before and after a laboratory course."

These people have gained a right state of mind, at any rate, in which to approach the arrangement of controlled experiment or the collection of statistics. And their observation of themselves and others may suggest hypotheses which more objective methods may test later on. . . . "I was interested to notice at Newnham that the scientists readily sought and acted upon the advice of doctors, nurses, dentists, and other qualified authorities; and followed carefully the printed directions with which patent dyes, medicines, foods, and beverages are supplied. The non-scientists were usually much less amenable in this way." The observation cries out to be supplemented by experiment and measurement, but it is already much better than dogmatism about what "science trains," and, also, it is much more subtle and interesting than the traditional statements which dogmatism usually gives us. I think that this contribution, in spite of its externalized form, is probably based largely on the author's sense of her own attitude towards authoritative directions, and on her experiences of finding more sympathy with that attitude in her scientific than in her non-scientific friends.

III.

It is this reflection on one's own experience, and the imaginative entering into other people's experience which should go along with it, that I definitely wish to defend. Our most modern makers of literature are developing it at the same moment that our behaviourist psychologists are deprecating it. The warnings are clearly useful, yet the method seems indispensable.

Does it not provide the indispensable first step, for instance, if we turn to examine some famous traditional doctrines? . . . " So if a man's wit be wandering, let him study the mathematics, for in demonstrations, if his wit be called away never so little, he must begin again." One's first question must surely be: " Have I found this true? " It seems to me that I have not. Between intervals of day-dreaming over mathematics I used to find that in this as in other subjects one could start again approximately where one left off. In very simple arithmetic, as in adding up long columns of figures, it might happen that all was too empirical and casual to give the mind a resting-place; yet even here one could scribble down an intermediate total and then dream safely. So far as I can find in my own experience nothing in the way of school work can *compel* continuous attention, though some kinds of work may help one to achieve it for a time if one so desires. A school examination with its strict time-limit may sometimes serve as such an aid, and so may a good physical training lesson, with mind and body working rapidly in concert and with the sympathy of numbers. Such things may enable some pupils to experience and appreciate the value of concentration, and to cultivate it elsewhere. Mental arithmetic well conducted may perform the same service for those members of the class who contribute the answers. The rest of the class, practising a paralysed staring, may be undergoing training of quite a different kind.

This brings us to a new and important point. Subjective observation can exhibit disciplinary injuries as easily as disciplinary values. And it can bring out, as objective methods by themselves cannot do, the all-important differences made by the pupil's success or failure, and by his antagonism or goodwill.

" I quickly learnt Latin grammar, and when the necessary grind was over was able to enjoy Latin poetry. Latin also called out my fighting powers, and however difficult the task I was always determined to make some kind of version. On the other hand, I disliked mathematics and hated the master, with the consequence that I slacked whenever I could, resented having to work at it, and never achieved any reliable

accuracy. My accuracy in Latin and inaccuracy in mathematics did not affect each other at all, so far as I can see, nor anything else."

"Over the mathematics home-work I used to get tired out because I always find that working against my will is a most exhausting business; and, finally, I used sometimes to do the most foolish things and make the simplest mistakes out of sheer angry tiredness. . . . I would not like to be positive, but I am morally certain that this lack of accuracy has spread to everything connected in any way with figures and measurement, from scientific experiments to such everyday matters as measuring a table to put the ping-pong net in the middle."

"Continual bad results convinced me that I had not the type of mind to be good at mathematics, and, eventually, the sight of a rider was enough to make me absolutely incapable of thought. I become mentally stagnant now when faced by a puzzle of any kind. When facts have to be obtained from given data the same feeling of hopelessness which used to seize me during those lessons comes upon me now, and I have to fight that before I can think quietly and rationally."

No doubt this experience represents only a small minority; nevertheless, few things are more surprising than the neglect by teachers, who say that such-and-such subjects should give such-and-such training, to enter fully into the experience of pupils who are below the average. "This task calls for accuracy, alertness, thoroughness of understanding, neatness of presentation." But will they come when you do call for them? And will those pupils remain merely unaffected to whom they do not come?

Ought we, perhaps, to try to organize at least two kinds of objective experiment besides those we have already? At present we ask Professor Thorndike and his colleagues in the field: "Can you find out for us, over a large extent, the average disciplinary value of learning Latin, or of learning mathematics?" Could we set him also a much harder yet possibly a more fruitful task, by asking: "What are the relative effects on a child of the work he can do and the work he can't do?" And then, perhaps, a question still harder and still more fruitful: "What are the respective results of working with and without goodwill?"

It is just conceivable that the very low average effect hitherto worked out is masking quite considerable effects which differ with the different children. But even if this proves not to be so, and the actually injurious effects are found to be exceptional and inconsiderable, even then the popularization of these questions should be wholesome in regard to some doctrines which still prevail in our schools. Professor Percy Gardner has contrasted the pagan mysteries with the sacraments of the early

Christian Church, on the ground that the pagans "were never able completely to sever themselves from magic; that is, the mystæ usually attached a mysterious efficacy to the mere act of partaking, apart from the action of will and heart which really gave it the possibility of being efficacious."*

IV.

One important limitation must be noted in the use of the subjective method: that we cannot employ it in tracing connections which lie outside of consciousness. Within consciousness, where a disciplinary effect consists of the implanting of a technique, the altering of an attitude, the sowing of an idea, the kindling of a valuation or an ideal—in all such cases, and in the corresponding indisciplines, the subjective method can be applied; and this holds good even when we should not be able to express the change in exact or adequate words. But if outside consciousness there is some other effect, some direct strengthening of a faculty independently of a change in attitude, technique, or idea, then the subjective method is unable to report on it. The task must lie with objective methods alone, and it is very difficult to devise such delicate methods as shall give an unambiguous answer. I have seen the question fairly put and the task begun in only one substantial contribution . . . the very interesting article by Dr. A. I. Gates in the twenty-seventh year book (1928) of the National Society for the Study of Education. Dr. Gates is inclined to think that this something different does not happen; but the question lies outside the scope of my paper.

V.

To sum up: My object has been in no way to deprecate those objective methods of investigation in which we follow our physical-science colleagues at a distance, but to claim that there are good reasons also for cultivating and refining the subjective method. When one of us is disposed to claim that the subject he serves should have certain effects upon its learners, he ought to ask himself: "Looking back, what effect can I watch it having upon myself?" When he thinks of the lower half of his class he should ask himself: "What was the effect on me, not of this subject, but of one in which I failed?" And when he thinks of some antagonistic pupil, he should ask: "How was I affected, not by this

* *The Ephesian Gospel*, page 206.

subject, but by that other which I hated, taught by a person whom I hope I shall never see again?" The answers will not take him all the way, but they will be a beginning. Habituation to such critical analysis should help us both critically and constructively, and suggest new applications for objective methods of inquiry. We need not be ashamed of the subjective method, provided we heed the objectivists' good advice. And, if anything has disciplinary value, such value should arise for the teacher who is led to develop a keen and truthful memory for the experiences of his youth, and a clear patient imagination for the experiences of the boys and girls who will work with him now and in the future.

RÉSUMÉ.

SUR LA DISCRIMINATION DE LA VALEUR DISCIPLINAIRE DES ÉTUDES.

L'auteur, par une analyse des rapports redigés par des étudiants, sur les effets qu'ils ont notés, comme résultat de leurs différentes études, arrive aux conclusions suivantes.

Il faut suppléer aux recherches expérimentales et statistiques par l'analyse de l'expérience de l'individu. L'analyse subjective, bien qu'elle ne soit point infaillible, devrait contre-balancer le dogmatisme traditionnel. Elle est capable de montrer des préjudices aussi bien que des avantages et peut révéler la différence, fort importante, résultant du succès ou de l'insuccès de l'élève, de son hostilité ou de sa bonne volonté; elle ne peut point faire voir des effets (s'il y en a) qui existent en dehors de la connaissance, par exemple le renforcement immédiat d'une capacité par opposition à un changement d'attitude, de technique ou d'idée.

Le but de cette étude n'est pas de condamner la méthode "objective," mais de soutenir que l'analyse subjective a quelque valeur comme auxiliare et comme source de suggestion, et qu'elle offre des avantages à l'éducateur qui la pratique.

ÜBERSICHT.

DAS UNTERSCHEIDEN DER ERZIEHERISCHEN WERTE DES STUDIUMS.

Infolge einer Analyse der Berichte von Studenten, die sich auf die durch verschiedene Studien erlebten Wirkungen beziehen, behauptet die Verfasserin, dass Folgendes bewiesen wird:

Man muss experimentelle und statistische Forschung durch Analyse individueller Erfahrung ergänzen. Subjektive Analyse, obgleich sie nicht unfehlbar ist, sollte überliefertem Dogmatismus entgegenhandeln; sie kann Nachteile sowohl als Vorteile zeigen; und kann den äusserst wichtigen durch den Erfolg oder das Misslingen des Schülers verursachten Unterschied, und seinen Widerstand oder sein Wohlwollen hervorheben. Sie kann keine Wirkungen aufweisen (wenn diese überhaupt da sind), die ausser dem Bereich des Bewusstseins liegen; z.B. die direkte Verstärkung einer Kraft im Gegensatz zu einer Veränderung des Gemütszustandes, der Technik, oder der Idee.

Die Abhandlung will die objektiven Methoden nicht missbilligen. Sie behauptet vielmehr, dass subjektive Analyse als Ergänzung und Quelle der Anregung wertvoll ist, und dass sie dem Lehrer hilft, der sie anwendet.

THE ASSESSMENT OF TEACHING ABILITY.

A SURVEY OF PROFESSIONAL OPINION ON THE QUALITIES OF A GOOD TEACHER.

BY R. B. CATTELL.

(*From the Department of Education and Psychology, University College, Exeter.*)

I.—*The demand for objectivity.*
II.—*Method of collecting evidence.*
III.—*Arrangement of results.*
IV.—*Qualities demanded of the young and the mature teacher.*
V.—*Differences of opinion among the assessors.*
VI.—*On the differences of the young man and young woman teacher.*
VII.—*Results of previous researches.*
VIII.—*A rating scale of teaching ability.*
IX.—*Summary of main results and suggestions.*
X.—*Bibliography.*

I.—THE DEMAND FOR OBJECTIVITY.

SINCE the introduction of the new, regional control of teacher training it has become increasingly necessary to obtain some relatively objective standard for the assessment of teachers leaving college.

Absolute objectivity, the empirical correlation of class progress with measured traits in the teacher, is at present, in all important respects, an attractive theoretical possibility beyond the realm of practical vision. Indeed there are many who, in denying its practical possibility, would like also to impugn its tenability as a theoretical goal. The pedagogue, with that contempt for examinations which he assumes out of school, will remark prosily that the most vital influences of a teacher upon his pupils are completely misused by any system of testing. And we must admit that it will probably be a very long time before psychological test methods become sufficiently refined to give the lie to such an assertion.

However, the present research makes no attempt to grapple with the ultimate problem of putting this branch of vocational selection on

a truely objective basis. It aims at getting an explicit and accurate statement of the basis of opinion on which teaching marks are now awarded. This seems to be the first practicable step towards greater objectivity and reliability. Logically it may appear that such a survey of opinion is no more likely to approach objective validity than, say, a symposium of the views of learned men in the year 1600 would have led to a true conception of the solar system. But the situations are not parallel, for all the facts relevant to these judgments are within the daily experience of our witnesses and produce a cumulative intuitive opinion which is constantly being revised and tested in practical situations. The errors in each individual opinion are likely to be largely of a personal, non-systematic kind and therefore such as would be eliminated by the averaging of a large number.

Discrepancies in the teaching marks awarded by Training College staffs, inspectors, head masters, and others are far more common than is generally admitted. A number of factors contribute to a slurring-over of these differences, chief among which is the tendency of colleagues who have long worked together to approximate unconsciously to a common standard of judgment. There is no reason why such collusion should yield results one whit more reliable than a truly independent judgment.

What is required is a clear statement of the values which the teaching profession as a whole assigns to various personal qualities. The employment of such an agreed, explicit scheme would not entirely eliminate differences of opinion in individual cases, for different judges have various degrees of success in eliminating personal prejudices and recognizing likes and dislikes derived from unconscious ideas irrelevant to teaching. But it would do away with the greater part of the fluidity which characterizes the present estimates and provide a clear, sound basis for discussion.

II.—METHOD OF COLLECTING EVIDENCE.

We were concerned to discover the attributes which judges believe to be important, to arrange them in order of importance, to bring them into a clear psychological scheme of quantitatively fixed, non-overlapping qualities, and to ascertain what differences, if any, exist between various types of assessor.

A questionnaire requiring the respondent to write down the ten most important traits of the good mature teacher, the ten most important qualities of the good young teacher, and the qualities which normally distinguish the young male from the young female teacher, was sent

to about fifty members of each of the following groups, who replied in the numbers shown.

Respondents.	*Male.*	*Female.*	*Total.*
Directors of Education	11 men (These alone were canvassed)		11
Inspectors	18 men	12 women	30
Staffs of Training Colleges and University Departments	17 men	26 women	43
Secondary Head Teachers	11 men	11 women	22
Secondary Assistant Teachers	6 men	16 women	22
Elementary Head Teachers	10 men	19 women	29
Elementary Assistant Teachers	12 men	10 women	22
Head Teachers of Infant Departments ..	—	11 women	11
Assistant Teachers of Infant Departments	2 men	16 women	18
Students in Training (Diploma and Certificate)	17 men	14 women	31
Pupils from upper forms	4	11	15
TOTALS	106 men	148 women	254
Totals used in final summaries (omitting students and pupils)	85 men	123 women	208

III.—ARRANGEMENT OF RESULTS.

Although we did not ask the respondents to arrange the ten qualities in order of importance it is safe to assume that the traits which first sprang to their minds were of greater weight than those which were hunted up from the recesses of memory to make up the tail of the list. Accordingly we weighted the first quality to about double the statistical importance of the last, giving 20 points to the first trait, 19 to the second, and so on to the last with 11 points. On a preliminary trial this method seemed to give an order to the qualities but little different from that obtained simply by summing the unweighted qualities. Nevertheless, although arbitrary, it must certainly have resulted in a closer approximation to the true order of importance. The values accumulating for each quality were then summed arithmetically and finally expressed as a percentage of the total for all qualities.

An immense range of qualities and a great variety of description faced us in the protocols. Gradually this miscellany was sifted down, as the research progressed, until we had arrived at a comprehensive list of twenty-two qualities into which all new descriptions could be classified with very little overlapping. At times a certain

TABLE I.

QUALITIES DESIRED IN YOUNG AND MATURE TEACHERS, SHOWING FREQUENCY WITH WHICH REPORTED. PROTOCOLS OF BOTH SEXES AND ALL CLASSES COMBINED.

	Label of Quality.	*Descriptive Terms included under Label but employed less frequently than Label itself.*	*Extent to which demanded of Young Teacher.*	*Extent to which demanded of Mature Teacher.*
			Per cent.	*Per cent.*
NATURAL GIFTS.	INTELLIGENCE	Good Judgment; Mental Capacity; Discrimination; Originality; Imagination; Wisdom; Vision; Insight; Resource; Mental Energy	6·4	9·4
	PHYSICAL HEALTH	Health; Physical Energy; Vitality; Strong Physique; Fitness	3·6	1·7
	PRESENCE	Grace of Person; Good Voice; Good Figure; Good Appearance; Dignity of Presence	3·2	1·8
CHARACTER AND TEMPERAMENT	SELF CONTROL	Moral Control; Emotional Stability; Power to Inhibit; Self Respect; Self Knowledge; Power to Efface Self	3·3	4·2
	PERSONALITY AND WILL	Self Confidence; Will Power; Decision; Power of Leadership; Character; Determination; Power of Inciting Others to Learn	8·8	8·9
	SENSE OF HUMOUR	Humour; Wit; Cheerfulness; Vivacity; Sociability; Happy Outlook	7·9	6·8
	KINDNESS	Love of Children and Sympathy with Adolescents; Youthfulness; Friendliness; Mercifulness; Benevolence	5·8	4·9
	OPEN-MINDEDNESS	Impartiality; Breadth of Outlook; Humility; Adaptability; Consistency; Sense of Justice; Willingness to Consider New Ideas	7·4	7·9
	SYMPATHY, TACT	Responsiveness to Feelings of Others; Sensitiveness	6·2	9·8
	ENTHUSIASM	Keenness; Zeal; Ever Fresh Interest in Subject; Ambition	6·8	3·4
	PERSEVERANCE	Industry; Thoroughness; Persistence; Patience; Sense of Duty; Reliability; Sticking to the Job	5·3	3·2
GENERAL DIRECTION OF SENTIMENTS.	ENTERPRISE	Absence of Conservatism; Love of Adventure; Sporting Sense; Willingness to take Risks; Moral Courage; Courage; Readiness to Self Criticism	2·7	3·6
	CONSERVATISM	Reverence for Tradition; Suspicion of New-fangled Ideas; Respect for the Past	0·3	0·2
	ALERTNESS OF MIND	Observant, Enquiring Mind; Determination to Profit from Experience; Critical, Thoughtful Outlook	2·3	1·3
	ORDERLINESS, PRECISION	Methodical Ways; Logical Mind; Tidiness; Punctuality	3·2	3·2
	IDEALISM	Belief in Value of Job; Good Philosophy of Life; Religion; Loyalty to Ideals and Persons; Intellectual Honesty; Sincerity; Desire to Co-operate; Altruism; Absence of Cynicism	7·4	6·5
	OUTSIDE INTERESTS	Interest in some Games, Hobbies, Music, Dramatics, Social Questions; Healthy Outlook on Life Generally; Married; Sexually Satisfied; Social Interests; Ability to Relax	2·6	3·1
MATTERS OF EDUCATION AND ACQUIRED SKILL.	KNOWLEDGE OF SUBJECTS	Paper Qualifications; Sound Academic Training	3·0	2·8
	GENERAL CULTURE	Liberal Education; Cultivated, Balanced Views; Knowledge of the World; Command of Language; Real Interest in Learning; Æsthetic Appreciation	5·9	5·8
	SOCIAL FITNESS	Good Manners; Correct Speech; Charm; Refinement; Sprung from a Good Home Environment	1·5	0·7
	KNOWLEDGE OF PSYCHOLOGY AND PEDAGOGY	Professional Training; Knowledge of Psychology and Teaching Methods; Understanding of Child Mind; Appreciation of Individual Differences	3·1	5·8
	CLASSROOM TECHNIQUE	Skill with Blackboard, etc.; Skill in Class Management; Experience in Class Discipline	3·2	5·2
			99·9	100·2

amount of interpretation was practised and occasionally complex qualities were analysed into the simpler psychological categories of our list. A conception of the descriptive material most frequently included under each of the twenty-two main labels can be gathered from the second column of Table I. There naturally remained a few odd qualities which defied classification and some quaint remarks which were difficult to dispose of, e.g., " To curb the tendency to consider that senior lessons require more careful preparation than junior " (Knowledge of Child Psychology) ; " A wife and family " (Outside Interests) ; " A complete indifference to his or her own health " (from an inspectress ; classified under Idealism) ; " An absence of old-womanliness " (Enterprise and Sense of Humour). Fortunately the majority of descriptions were not such teasers. The twenty-two qualities have been roughly ranged in order from those most innate and least susceptible to training to those that are almost purely matters of education. They fall into four groups : Natural Gifts, Character and Temperament Qualities, General Direction of Sentiments, and Matters of Education and Acquired Skill.

IV.—Qualities of the Young and the Mature Teacher.

We begin by presenting the final results for the qualities most desirable in the young and the mature teacher. Students and pupils have been omitted from the contributors, but each of the remaining nine groups has been given equal weight in determining the final result.

It is interesting to notice in what outstanding way the demands on the young teacher differ from those on the mature teacher. The young teacher is required to show more Perseverance, Enthusiasm, and Alertness of Mind. The qualities of Social Fitness, Physical Health, and Presence are also emphasized. We find, as we might expect, that for the mature teacher Classroom Technique and Knowledge of Psychology and Pedagogy are expected to be higher. He is also required to show greater Intelligence, Sympathy, and Tact. In all other matters there is a very close agreement in the qualities demanded of the teacher at the two stages of his career.

V.—Differences of Opinion among the Assessors.

In Table II the percentages in which these qualities are demanded by each of the eleven groups of respondents are set out. The various professional groups show a fair agreement in the order of importance which they assign to the qualities ; at least, there appear to be no cases

TABLE II.

IOWING IDEAL QUALITIES OF YOUNG AND MATURE TEACHER AS CONCEIVED BY VARIOUS GROUPS OF RESPONDENTS (PERCENTAGES OBTAINED AS IN TABLE I).

Class of Respondents.	*Directors of Education.*		*School Inspectors.*		*Staffs of Training Depts. and Cols.*		*Secondary School Heads.*		*Secondary School Assistants.*		*Elementary School Heads.*		*Elementary School Assistants.*		*Infants, Elementary School Heads.*		*Infants, Elementary School Assistants.*		*Students in Training.*		*Older Pupils in Schools.*	
Quality.	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*	*Y.*	*M.*
NTELLIGENCE	6·9	8·5	7·9	10·0	10·6	10·9	7·1	10·0	2·5	7·5	3·3	9·2	5·5	9·9	7·2	13·1	7·5	7·1	5·7	7·3		3·8
'HYSICAL HEALTH ..	5·1	1·0	4·3	1·3	5·8	3·6	3·3	1·5	5·3	3·4	2·9	1·2	1·5	0·7	0·0	0·7	1·6	0·0	4·0	1·6		0·3
'RESENCE	0·7	0	5·0	2·8	2·2	1·6	5·4	2·9	2·2	2·3	4·1	2·0	3·7	0·8	2·0	1·1	0·7	0·7	2·4	1·3		0·0
ELF CONTROL.. ..	5·6	6·1	0·3	2·3	4·3	4·3	4·5	3·4	4·0	5·2	3·8	3·2	3·6	4·9	1·8	3·1	1·5	7·0	2·2	1·8		2·1
'ERSONALITY AND WILL	5·9	11·6	8·7	10·1	7·5	5·7	5·3	7·2	11·1	8·4	7·8	8·0	12·0	13·3	10·2	9·9	8·8	7·2	8·2	9·1		12·2
ENSE OF HUMOUR ..	8·1	8·1	6·6	4·7	6·7	7·5	9·2	8·7	7·2	8·3	7·2	6·1	8·6	4·8	13·0	7·4	8·3	6·7	4·4	5·3		6·4
KINDNESS	6·3	5·9	8·4	3·6	5·5	5·2	3·7	2·8	5·2	5·4	7·2	5·5	3·8	5·5	8·3	6·6	4·6	6·0	4·8	8·7		2·6
)PEN MINDEDNESS ..	9·4	5·4	10·1	8·6	4·7	10·5	6·8	8·7	6·7	5·4	7·5	9·5	7·3	6·4	7·7	9·0	6·4	6·1	7·1	6·2		11·3
SYMPATHY, TACT ..	3·6	6·4	2·6	10·8	5·0	6·3	5·0	10·8	7·5	11·5	8·2	11·1	6·5	8·8	8·5	9·0	12·8	14·0	9·4	9·2		17·1
ENTHUSIASM	5·0	2·8	7·5	4·4	6·1	2·8	8·6	4·1	6·2	1·3	4·1	3·6	7·8	3·4	9·7	5·1	9·0	4·6	9·1	5·3		3·5
PERSEVERANCE ..	7·7	3·4	4·8	2·7	4·9	3·0	3·3	1·8	3·8	2·4	6·6	4·8	5·4	3·6	4·6	1·4	9·9	6·9	2·2	2·3		1·7
ENTERPRISE	3·0	2·8	3·2	3·8	3·3	4·1	1·9	1·8	3·1	4·1	1·0	3·0	4·9	5·3	2·1	4·4	2·2	3·2	3·8	5·6		0·9
CONSERVATISM ..	0	0	0·7	0·8	0·2	0·0	0·0	0·0	0·0	0·0	0·5	0·0	0·4	0·4	0·0	0·0	0·4	0·0	0·9	0·4		0·0
ALERTNESS OF MIND ..	1·0	0·8	1·5	0·0	2·5	2·3	2·2	0·0	1·0	0·0	3·8	2·4	3·5	2·0	2·5	4·0	3·2	1·5	1·1	2·1		0·4
ORDERLINESS, PRECISION	2·4	5·9	5·8	4·7	1·1	3·0	2·8	2·9	4·0	3·0	4·6	2·1	1·4	2·8	1·4	0·6	4·7	5·6	3·3	0·9		2·1
IDEALISM	8·6	5·4	5·2	3·9	9·1	8·8	9·7	8·8	7·0	7·4	8·3	7·0	6·6	5·6	3·5	3·5	5·8	5·6	3·8	4·9		6·0
OUTSIDE INTERESTS ..	4·9	2·5	2·0	3·7	3·1	3·5	1·5	4·6	2·8	4·6	2·1	4·5	2·2	0·6	5·2	4·1	1·6	2·1	3·4	5·6		2·2
KNOWLEDGE OF SUBJECTS	1·0	2·6	3·3	4·1	2·6	2·2	4·4	3·3	5·5	4·4	3·4	2·7	3·7	1·1	0·0	0·0	0·0	2·0	5·5	2·6		4·6
GENERAL CULTURE ..	14·0	8·3	9·5	9·7	6·6	5·6	4·5	5·6	4·5	6·5	5·3	5·2	3·0	2·8	3·4	4·2	4·0	4·1	6·0	7·6		4·6
SOCIAL FITNESS ..	3·0	2·8	1·4	0·0	1·0	0·9	1·2	0·0	0·8	0·0	2·5	0·9	1·0	0·6	2·1	1·0	2·5	2·7	1·0	0·5		0·9
KNOWLEDGE OF PSYCHOLOGY AND PEDAGOGY	2·5	5·4	1·2	3·9	4·3	4·4	3·1	8·8	3·4	4·5	2·8	5·7	2·5	8·5	5·0	6·8	3·0	2·7	5·3	11·2		7·5
CLASSROOM TECHNIQUE	2·7	3·8	0·3	5·9	1·6	3·0	6·3	6·7	6·2	4·7	2·6	4·2	4·9	8·2	1·6	4·9	1·7	4·4	6·3	4·8		9·5

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of negative correlation. Thus the estimates of Inspectors and Training College Staffs correlate (for Young Teacher) to the extent of ·23, P.E. ·14. Secondary School Heads and Inspectors correlate ·36, P.E. ·13; and Elementary School Heads and Assistants to the extent of ·23, P.E. ·14.* These correlations are chosen at random.

By running down the lists and observing which group has the extreme value (Young and Mature combined) in each quality one may glean the following interesting facts as to difference in opinion among the judges. Enterprise is particularly demanded by Elementary School Assistants and Students in Training; Conservatism and Respect for Tradition by Inspectors. General Culture and Social Fitness are greatly valued by Directors of Education and little by Elementary School Assistants. The latter stress Classroom Technique, as do also the Heads of Secondary Schools. Training College Staffs believe General Intelligence to be of paramount importance, and lay little emphasis on Orderliness and Precision. Inspectors esteem the last-named quality along with Open-mindedness and Good Presence, which, however, is considered of relatively little importance by Infant School Assistants and Directors of Education. Sympathy and Tact, Perseverance and Enthusiasm are demanded by Infant School Teachers, who give correspondingly little importance to Physical Health. Elementary School Heads incline to the same outlook. Students and Inspectors seem to overlook to some extent Sense of Humour and Self Control, but the latter is required to a high degree by Directors. Pupils demand a relatively great amount of Sympathy and Tact, Personality and Will (Leadership), and Sense of Justice (Open-mindedness).

Now a low estimate in any given quality by any particular group might conceivably arise because the members of that group are inclined to take it for granted that the quality will be present. But such a supposition reflects on the intelligence of our witnesses who were not asked to suppose that any quality was already present, and it fails to agree with the general results of Table I, in which there is no evidence of any set of qualities being anywhere pre-supposed. Unusually high or low estimates might therefore arise owing to the peculiar viewpoint from which the assessor sees the teacher, or to the fact that he finds particular qualities of especial importance in his own line of teaching, or to the fact that in experience of teachers in his own field of instruction he has always found certain qualities insufficiently forthcoming. The last two alternatives are virtually one and the same thing. It seems

* These correlations are by Spearman's Foot-rule Formula: by the Pearson-Bravais Formula the values are ·065, ·056, ·110 respectively.

reasonable to suppose, therefore, that the groups of teachers responding are giving particularly the qualities necessary in their own specialist line of instruction, whilst the peculiarities of the groups not actively engaged in school teaching (Inspectors, Directors, Pupils, etc.) are due to their particular relation to the teacher. Hence we have in Table II a rough guide to the special demands of various branches of teaching and we are also able to realize therein why Head Masters stress Classroom Technique, Inspectors Open-mindedness, Training College Staffs General Intelligence, and Pupils Sympathy, Tact, and Justice.

VI.—On the differences of the young man and young woman teacher.

It is clear, when one begins to consider the finer points of assessment, that women teaching girl pupils cannot be gauged on the same measuring staff as men dealing with classes of boys. Doubtlessly in the main the same qualities are necessary in the make-up of men as of women teachers, but obviously beyond a certain point there must arise a divergence between the attributes possessed by the good male teacher on the one hand and the good female teacher on the other.

Our respondents, with the exception of the pupils, were asked to write down the five qualities which normally distinguish the young woman teacher and also the five which normally characterize the young male teacher. As before, the first qualities given in each list were weighted, in the statistical summation, to about double the importance of the last, i.e., 10, 9, 8, 7, and 6 points were given to the five consecutive qualities. On this occasion negative values had to be used too, since replies frequently contained such remarks as "Absence of initiative," "Lack of sense of humour," which clearly were best expressed by inserting negative values opposite those qualities. A second new feature is the tendency of qualities to fall into pairs of opposites, as shown in Table III.

Here again there was very good agreement among all classes of respondents, but only the final, total results are given in Table III (men and women separately). Of the thirty qualities listed men agree with women on the differences between men and women in twenty-five instances. But even on the five remaining cases we are not left in complete uncertainty. For example, there is a difference of opinion where women fail to agree with men that women are more dependent and stereotyped in their activities than men. Yet at the same time

DIFFERENCES, IN EXTENT TO WHICH QUALITITES ARE POSSESSED, WHICH NORMALLY DISTINGUISH YOUNG MALE FROM YOUNG FEMALE TEACHER
(RESULTS EXPRESSED, BOTH FOR MALE AND FEMALE, AS PERCENTAGES OUT OF 100 FOR ALL QUALITIES TOGETHER.)

			Men's Estimates of		*Women's Estimates of*	
Chief Term for Quality.		*Terms employed, but less frequently, in describing Qualities.*	*Male Teachers.*	*Female Teachers.*	*Male Teachers.*	*Female Teachers.*
ENERGY		Forcefulness; Strength, Sturdiness; Reserve of Energy; Vigour and Alertness	8·4	−0·6	−7·6	−3·0
INSIGHT		Adaptability; Quick Working Brain; Alertness; Ingenuity; Intuition of Children's Thoughts; Observant	0·2	2·3	−1·0	5·2
SELF CONTROL		Even Temperament; Steadiness; Absence of Moods, Changeableness, Worry, Bad Temper and Over-sensitiveness; Easy on Nervous Energy	2·6	−5·0	3·1	−5·1
KINDNESS		Love of Children; Unselfish Effort; Gentleness; Greater Play of Sentiment	1·1	3·4	1·6	1·7
SENSE OF HUMOUR		Cheerfulness; Less Serious; Friendliness; More Approachable; Comradeship; Good Nature; Optimism	4·0	0·7	7·5	−1·1
TACT AND SYMPATHY		Understanding of Others; Rapport with Child Mind; Ability to Arouse Interest of Others; Sympathy with Child's Outlook	0·2	5·9	−2·4	7·1
PERSEVERANCE		Industry; Patience; Thoroughness; Methodical; Persistence	−3·2	4·9	−4·2	10·6
ENTHUSIASM		Zeal; Fanaticism; Stimulating Earnestness	1·3	11·0	−1·9	5·8
LOYALTY		Devotion; Trueness to Spirit of School; Reverence for Authority; Subservience; Reliability	1·2	3·0	0·0	1·4
IDEALISM		Absence of Cynicism; Reconciliation to Partial Failure; Pride in Life's Work; Emotional Freshness	0·0	3·2	0·0	3·3
SENSE OF PROPORTION		Planning Capacity; Logical Mind; Realism; Accessible to Reason rather than Emotion	11·3	−1·5	15·6	−2·7
VANITY		Conceit; "Superiority"; Personal Malice and Unjustness; Sarcasm	0·2	2·8	1·6	0·5
PAIRS OF OPPOSITES.	CONSCIENTIOUSNESS	Meticulous Attention to Detail; Over-anxiety; Respect for Routine; Inability to Leave School Behind	−3·7	32·0	−3·5	38·0
	CASUALNESS	Complacency; Cocksureness; Hastiness; Indifference to Thoroughness	11·5	0·0	14·5	0·0
	OPEN-MINDEDNESS	Open to New Methods and Advice; Imagination; Swayed Easily; Too Sensitive to Criticism	1·4	3·1	0·0	3·3
	DOGMATISM	Intolerance; Obstinacy; "Knows Everything"; Non-Co-operative; Opiniated	6·1	0·0	3·3	0·0
	DEPENDENCE	Lack of Initiative; Stereotyped Activity	0·7	1·8	3·9	1·3
	INITIATIVE	Adventurous Disposition; Sporting Willingness to Take Risks	8·7	−1·0	4·5	1·1
	AMBITION	Self Assertion; Demanding Power and Responsibility; Pride in One's Position as a Teacher; Assurance; Domination of Children	14·3	1·0	10·7	−0·6
	AVOIDANCE OF RESPONSIBILITY	Self Effacement; Avoidance of Responsibility; Self-conscious Reserve	2·1	3·2	0·0	2·7
	PRIDE IN SOCIAL GRACES	Polish; Courtesy; Interest in People and Social Life; Refining Influence; Personal Dignity; Æsthetic and Cultural Appreciation; "Refained"; Snobbish	0·0	11·0	0·0	5·4
	INDIFFERENCE TO SOCIAL GRACES	Less Courteous; Callow; Slow to Mature; More Natural; Not so Punctilious; Slovenly in Manner	3·3	0·0	4·7	0·0
	WIDE INTERESTS	Interest in Children's Out-of-School Activities; Interest in Sport and Hobbies; Interest in Objective World, Geography, Science, etc.	16·5	1·2	18·5	0·6
	NARROW INTERESTS	Scholastic Exclusiveness; Clannishness; Engrossed in School Life, Narrow Outlook	0·6	7·0	0·0	2·5
	CHILDREN BEFORE SUBJECT	Personal Interest in Children; Attention to Child's Viewpoint and Child Psychology	−1·8	1·6	0·0	4·8
	SUBJECT BEFORE CHILDREN	Bookish Knowledge; Failure to Descend to Child Level; Interest in Subject rather than Children	2·7	2·8	6·3	0·4
ATTENTION TO VOICE		Trained Voice; Emphasis on Good Speaking; Volubility; Tries to teach with too much Talking; Dramatic Power	0·0	5·7	−1·2	0·8
DISCIPLINE: (1) BY LEADERSHIP		Easy Discipline; Spirit of "Bonhomie"; Leads the Class in Spirit of Comradeship	2·8	1·3	1·2	1·7
(2) NAGGING		Discipline of Strictness over Trifles; Exacting, Insistent, Detailed Correction	0·0	2·0	0·0	1·5
(3) BRUTAL		Harsh, Crushing Discipline; Fondness for Corporal Punishment				

women agree in assigning to men a relatively high (4·5 : 1·1) endowment of the opposite qualities of Initiative and Willingness to take risks.

To pick out any particular qualities for special mention from Table III is perhaps superfluous, for, as we have seen, the majority are associated with significant, agreed differences. Yet a few are quite outstanding in the disparity of their distribution between the young male and the young female teacher.

One might mention particularly the greater conscientiousness and anxious care in women teachers, with the corresponding tendencies to casualness and complacency in the young man; greater sense of proportion and planning capacity in men; greater refinement and pride in social graces in women, with corresponding callowness in young men. Young women teachers also are thought to have far less sense of humour but greater insight and adaptability. Respondents did not attempt to assert any differences in regard to intelligence, which is a good sign for the soundness of the estimates, for experimental psychology has already given a verdict of equality. The differences believed to exist in the type of discipline maintained are also of some importance.

VII.—RESULTS OF PREVIOUS RESEARCHES.

Having presented the main findings of our enquiry, we turn to the more embarrassing problem of using them as a basis for a scheme of practical assessment. We will begin by pooling the separate figures for the young and the mature teacher in Table I and arranging the attribute values thus obtained in descending order of magnitude, as in Diagram I. This amalgamation gives greater weight to the ultimate figures and provides the most general scale possible for the assessment of teaching ability. In this diagram we have indicated in what way the average for all the male respondents differs from that of the female respondents on each quality. These differences may be of importance in any later discussion.

But before proceding to constructive work from our own results we will bring forward previously gathered evidence as to the estimation of teaching ability which, especially in America, has already reached considerable proportions.

In the first place we will consider researches on closely similar lines to our own, mostly carried out by the questionnaire method. Sprague,[39] basing his conclusions partly on a questionnaire sent to superintendents, principals, and training college staffs and partly on the work of Boyce, Moses, Ruediger, Strayer, Littler, Buellesfield, and Elliot, arranged the

attributes of a teacher in the following order of importance : (1) Teaching Skill, (2) Classroom Management, (3) Personality, (4) Preparation. Such a scheme must at once be criticised because it presents overlapping categories and because it analyses on at least two planes: that of the character of the teacher himself and that of the interaction of the teacher with his class. Bird[3] sums up much of the earlier evidence as follows : " The results of the investigation of Boyce, Ruediger, and Strayer[7] indicate that from the point of view of the supervisor the most important qualifications of a teacher are instructional skill, discipline, initiative, and experience. According to Sherman Littler,[25] the usual reasons for the failure of teachers are poor discipline, weakness of personality, lack of teaching skill, lack of interest, laziness, failure to co-operate, or poor health. It was found by Miss Moses that among twenty-six school systems the ten most frequent causes of failure were judged to be : poor instruction, weakness of personality, lack of interest, weakness in discipline, lack of sympathy, inability to co-operate, unprofessional attitude, weakness in knowledge of subject matter, disloyalty, immorality, and poor health. Buellesfield concludes that weakness of discipline, lack of judgment, deficient scholarship, and poor methods of instruction are the chief reasons for lack of success."

There is also some evidence on the differentiation of the young and the mature teacher, namely, in the enquiry of Downey,[13] in which unfortunately the occupation, age, and sex of those answering the questionnaire do not appear to be stated, although the other facts are given in some detail. Younger teachers are concluded to be more enthusiastic and sympathetic; older teachers more stereotyped, unprogressive, and marked by objectionable psychic idiosyncrasies. Older teachers are better disciplinarians and show greater attention to detail. This research is summed up in the conclusion that younger teachers have the better dispositional traits, older teachers the better mental equipment. A subsidiary finding is that " Health and temper suffer more from continuous teaching in the case of women than of men."

The part which the teacher plays in the total school influence is discussed by Witham,[43] who desires to get a measure of the efficiency of a whole school. Out of the total influence, including school building and planning of courses, he gives sixty per cent of the points to the teacher alone. He proceeds to enumerate forty characteristics by which the teacher may be assessed. Fifteen of them refer to actual teaching skill, but all are arbitrarily chosen and of little value for our statistical treatment.

A sound criticism of the confused conceptions and unsatisfactory

research plan in a number of these researches is made by Pittenberger[31] in an article emphasizing the outstanding need to "objectify what now exists subjectively." He argues that teaching efficiency may be assessed on any one of three planes: (1) the plane of results, or pupil achievement, (2) the plane of the teaching and learning process, and (3) the plane of the teacher's equipment for teaching—native and acquired. This is a valuable step towards clarity. One might point out further that teaching ability is strictly only measurable on the first of these planes, i.e., in its effects, but that by empirically determining the relationship of the three planes it should be possible to establish criteria in any one of them. Ultimately we want to know what teaching ability means in terms of the third plane—in terms of the character qualities of the teacher. Pittenberger refers to a number of other pitfalls, notably the tendency to make assessment schedules with overlapping qualities and "the visionary task of developing a schedule for measuring all teachers in all grades and subjects and upon all planes."

Beginnings have been made with objective measurements of the values of certain qualities, notably in the work of Taylor[40] and Cooper.[11] Cooper, after referring to the earlier work of Monroe and Bagley on similar lines, proceeds to correlate intelligence test scores with teaching marks and finds a mean square contingency coefficient (Pearson) of 0·216. With the same 107 students a coefficient of 0·332 was found between teaching marks and performance in college examinations. From this the conclusion is rightly drawn that intelligence tests are of little value in predicting teaching ability among college students who are already selected for intelligence. Payne[30] found, however, that all failures in teaching were within the lowest third of classes graduating from high school. He also found that in the Head Teachers' estimates of student teachers' success in "Management of Children," "Efficiency of instruction," and "Attention to details of school business," more than twice as many received "excellent" for "Management" among the first third as among the last third in the scholarship records. Efficiency of instruction was still more closely related to scholarship. He sums up by saying that these results "lead to the unmistakable conclusion that scholarship, measured by the standards of the schools, will indicate success in teaching in after life, in spite of the numerous exceptions to the rule that lead to the erroneous statement that there is no correlation between scholarship and teaching ability." The above results seem to indicate that ordinary examinations, perhaps inasmuch as they test character qualities, are rather better guides to teaching ability than bare intelligence tests.

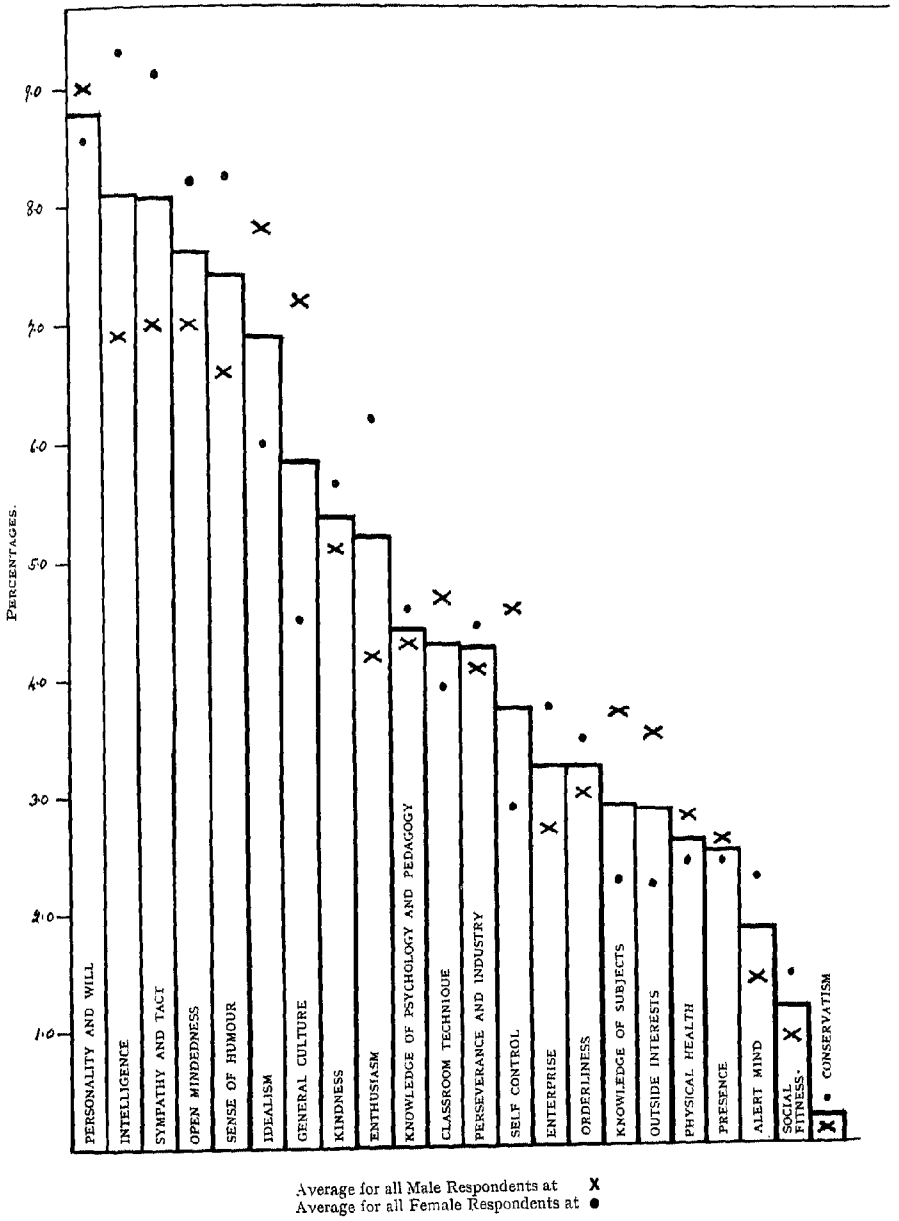
A second line of approach which ought not to be neglected concerns itself with the pupils' viewpoint of the teacher. One of the earliest enquiries here (Sanford Bell)[2] showed that the most helpful teacher in the memory of the 1,000 adult respondents was, in the statistical, composite picture, kind, encouraging, honest, clear, charming in person, and athletic (in that order). The teacher most liked was kind, interested in pupils individually, confiding, and good (morally estimable). The most disliked teacher was supercilious, unsympathetic, haughty, harsh, fault-finding, eccentric (especially in punishments), unjust, sarcastic, and insulting. Bell also found that four-fifths of the men and half of the women testified to receiving the greatest moral and intellectual influence for good from men teachers, although actually on the whole they had been more in the hands of women teachers (U.S.A.). The teacher who had the greatest influence for good was also the teacher most liked in 61 per cent of men's reports and the same percentage of women's.

A similar enquiry was that of W. F. Book, who made a statistical study of the essays of more than a thousand high school students on high school education and teachers. The qualities of the most sympathetic teacher ultimately ranked in the following manner. (1) Kindness (forgiving, generous); (2) Cheerfulness (even tempered, witty); (3) Thoughtfulness for pupils' feelings; (4) Firmness; (5) Inspiring (easy to approach); (6) Strength and nobility of character; (7) Earnestness; (8) Politeness; (9) Sincerity; (10) Unselfishness. Girls required of the teacher that she should (1) Understand girls; (2) Be young and enthusiastic; (3) Be interested in the work; and (4) Know a great deal. Boys wish their teacher (1) To be just; (2) To show confidence and trust in his pupils; and (3) To take an interest in their lives. Reymert,[33] enquiring of 714 college students, found that their best teacher was jovial, self-controlled, just, and interested in social activities. He obtained data as to the age at which the pupils received the most good and the most bad influences from their teachers, and concluded further that the good teacher was more frequently a young than an old one, and that a teacher was at his best at about 34 years of age.

According to Bird, in the research already mentioned, Kratz,[24] who collected the views of 2,411 girls and boys in grades one to eight, found kindness, patience, politeness, neatness, and discipline most appreciated. She herself concludes that kindness, fairness, sociability, sense of humour, good temper, discipline, neatness, patience, preparation, and clearness of expression, in that order, are demanded by the pupil. There was a close correspondence between the demands of Normal and

DIAGRAM I:

SHOWING QUALITIES OF A GOOD TEACHER ARRANGED IN ORDER OF ESTIMATED IMPORTANCE (YOUNG AND OLD COMBINED).



Average for all Male Respondents at X
Average for all Female Respondents at •

High School girls and also between those of Normal and High School boys. Girls stress kindness, neatness, and clearness of explanation; boys fairness, sociability, and sense of humour.

From these half dozen independent but harmonious researches (including the results of our own relatively insignificant group, which also agree with the larger researches) we may conclude that, in the categories which we have chosen in this research, the pupil's conception of the best teacher is expressed by the following order of qualities: (1) Kindness, (2) Sense of Humour (cheerfulness), (3) Open-mindedness (justice), (4) Sympathy and Tact, (5) Self-control, (6) Personality and Will (leadership), (7) Outside Interests, (8) Perseverance (patience), (9) Orderliness (clarity), (10) Presence.

How far the pupils' ideal of the teacher, differing as it does so decidedly from the views of other groups, should be given weight in drawing up a rating scale for teachers is open to discussion. But the fact that the pupil cannot be aware of the complexity and ultimate goals of the educational system in which he is being brought up, and the well-known hedonistic psychology of the schoolboy, seem to justify our omission of the pupils' estimates from the next task: that of preparing a schedule for the rating of teachers.

VIII.—A RATING SCALE OF TEACHING ABILITY.

The model for our rating scale clearly lies in Diagram I, which represents in a quantitative form a consensus of professional opinion. We shall see later that there are certain factors which render such a direct translation into a rating scheme liable to revision and limitation, but for the present we will proceed with the unfolding of the plan in its simplest form. Such a scheme would require the teacher to be assessed separately on each of the qualities. The possible score on each of these would be the value assigned to it in Diagram I, and the teacher's final mark would be the sum of all these separate assessments. Since it is easier for most people to estimate values, especially relative values, in visual terms, it would be most convenient in practice to have for each student a card bearing a replica of the figure in Diagram I and for the supervisor to draw a line across each of the columns at a position representative of the degree to which the student possesses the quality indicated by that column. If the diagram were also divided up into squares it would then be a simple matter to read off the area beneath these lines—the score of the student. With twenty-two qualities to deal with the process might be more laborious for the supervisor than are his present methods, but it would almost certainly be more accurate.

To put the scheme into a thoroughly practicable form it would be necessary to overcome certain well-known difficulties in the practice of quantitative estimation. Chief among these difficulties are the tendencies of some assessors to "scatter" their estimates more or less than a normal amount and the tendency of almost all assessors to deal out individual estimates which lead to a higher average than the one which the assessors were instructed to regard as the average. Both of these sources of error may be overcome by methods which we shall ultimately introduce into the scheme, but another disturbing factor, the "halo" effect which causes the person who has awarded a student a high mark in one good (or bad) quality to give him an unduly high mark in other good (or bad) qualities, can only be overcome by careful analysis on the part of the assessor himself.

Professor Godfrey Thomson[41] has responded to these difficulties in his preliminary attempt at a rating scale by suggesting that, as in the American Army Rating Scale for officers, the estimate should be made in relation to certain "standard individuals" known to all the assessors. Thus a certain Smith would be given a value for, say, "Sympathy and Tact" by fixing his position in respect to a scale of, perhaps, five standard individuals, who, in the estimations of those who have long known them, range between the furthest limits in the possession of that quality. This approach to the method of paired comparisons is, however, not easily workable in a training college in which the "standard individuals" are probably as transient as the material to be measured. The difficulty of scatter has been met by Thomson with the suggestion that the ultimate teaching marks, A, B, C, D, and E, should be awarded with a certain definite frequency: 5 per cent of A's, 20 per cent of B's, 50 per cent of C's, and 25 per cent of D's and E's together. In this way the estimates of all assessors would be extended or contracted to a uniform scatter. A very similar distribution has been suggested in a circular from the Board of Education, but an examination of the records of most training colleges will show a distribution skewed towards the upper end, with too many B's, insufficient C's, and remarkably few A's and E's. There is frequently a desire to "maintain a high standard" by economizing on A's, but this is done without regard to the fact that the standard is already being lowered by too liberal a use of B and insufficient use of D. Moreover the five point scale is virtually reduced to a three point one by the failure to make use of A and E.

These problems, and a number of others concerned with the psychology of the assessor, affect the estimates of most of the qualities, but there

are a few items which could be measured objectively by test and examination: Intelligence, Knowledge of Academic Subjects, and Knowledge of Psychology and Pedagogy. It is also probable, as I have argued elsewhere,* that some objective estimate of certain nuclear components in what is usually described as "Personality and Will" could be obtained by the use of the psycho-galvanometer.

In a college having fifty or more students in each year it should be entirely safe to assume that the average student ability does not vary appreciably from year to year. It should, therefore, be possible to fix the standards each year by the performances of the students, without any fear that the standards are fluctuating in any perceptible degree over the course of years. After all, there is in reality no absolute standard of teaching excellence; the conception of the normal and the excellent teacher must ultimately vary with supply and demand in the teaching profession, and with many other sociological factors, and the absolute standards which we uncritically assume to be carried in our minds will generally prove on introspection to be based on a very small number of individual, stock recollections.

This being so, the best course is clearly to adopt a normal frequency distribution, some agreed relation in the percentages of A, B, C, D, and E marks awarded, and to fix the dividing lines between the classes each year according to this standard frequency distribution.

The simplified procedure in the use of the rating scale to which these arguments lead is as follows. In each of the qualities all the students in the group are ranked in order of their possession of that quality. This will be found to be a much easier task than that of assigning numerical values directly to each student. The first 5 per cent on the list are given an A mark, the next 20 per cent a B, the next 50 per cent a C, the next 20 per cent a D, and the last 5 per cent an E (providing there has been no previous elimination of failures). Then, on a card similar to that already described, but with each column divided into five equal parts, the values—A, B, C, etc.—obtained in the above manner, are inserted for each quality. The area beneath these lines is the required measure of the student's teaching ability and can be expressed by a simple mathematical transformation as a value on a five point teaching scale.

At this point we must turn to some less obvious considerations which, though they do not invalidate our conception of a scale, necessitate

* "Experiments on the Psychical Correlate of the Psychogalvanic Reflex." *Brit. Journ. Psychol.*, XIX, 4, page 378, 1929.

certain modifications and bring us, in fact, to those " revisions and limitations " of the simple scale which we mentioned at the outset.

According to the simple additive scheme of compounding estimates which we have suggested it would be possible for a candidate to receive a high total score—a mark of high teaching ability—even though he show a complete absence of some important quality, e.g., Perseverance, Knowledge of Subjects, Intelligence, simply on the basis of a general high score on each of the remaining qualities. This is clearly a serious flaw. A less obvious flaw lies in the inability of the system to respond to the fact that it is perhaps possible to have *too much* of any single quality. For the majority of the qualities in the list the possibility of an excessive endowment is out of the question, but it might be asserted to exist with Sense of Humour, Outside Interests, and, less certainly, with Enterprise and Kindness. Against this assertion it may well be argued that when we say so-and-so has " too great " a sense of humour or " too many " outside interests we mean, not that his sense of humour or interest is really greater than that of some unimpeachable person, but rather that it is not held in check by, or has destroyed, certain compensating qualities, e.g., Self Control, Idealism, Enthusiasm for Teaching, Perseverance, or Orderliness. Now the absence of these qualities would be indicated on the rating card and would disqualify the person from consideration as a good teacher.

Nevertheless, these arguments suggest that in the normal way we judge not merely by the sum of a series of quality valuations, but also by their degree of balance and integration. In terms of our assessment chart this would mean that the students' curve must not only include a certain minimum area, but, in addition, approximate to a particular " profile "—that which appears in Diagram I.

This is not the place to enter on the difficult enquiry as to how best to combine the simple sum of quality values with a profile index in order to produce a single final estimate. For practical purposes it seems sufficient to make the stipulation that the student who falls below a certain, empirically-determined minimum value in any single personality trait shall be disqualified from joining the class to which he would otherwise belong, whatever his score may be for the remaining qualities.

A second question arises from a closer scrutiny of our procedure: Are we to consider the average or median value in our estimates as that of mankind in general or as that obtaining among teachers alone? Clearly, according to the origin of our results and the methods of assessment which we have advocated, the zero and median values in these

character traits must be those of the teaching world alone. But we must bear in mind that certain qualities have already been taken into account in admitting students, and in virtue of this selection our zero value is quite different from that for humanity as a whole. Accordingly in those instances where it is considerably higher, the assessor is required to discriminate and make valuations of these qualities over a relatively small range of scatter. Here enters the danger of the assessor confusing the measuring rod which he is unconsciously and constantly applying in everyday life with the scale of values which obtain in the selected student group. Such an error is easily avoidable when the above-mentioned ranking procedure is practicable, i.e., in large colleges, but elsewhere, as e.g., in the selection of teaching candidates from schools (the problem which we shall next consider), a clear realization of the different standards is the only safeguard. The principle can be readily illustrated by considering one quality—Intelligence: an I.Q. of, say, 105 would put its possessor in the C class as regards the general population, whereas the same person would fall into the last quartile among teachers (see below) and be rated as D or E.

Naturally, the scheme ought ultimately to be refined by taking account of the differences in the work of men and women teachers, of teachers in different types of school and in various subjects; but it would seem premature to proceed into such minor features until the main scale has been tested by a thorough practical application. Moreover, these subsidiary points, not having been adequately dealt with in this, our first enquiry, await fuller investigation.

More pressing perhaps than the problem of assessing teachers about to leave college is that of estimating the prospects of teaching success in those about to enter a training college. In some ways, too, that offers a less complex undertaking than we have had to face in rating the trained teacher, for here we have to deal only with the inherent character traits, not with the natural endowment plus all that has been acquired in the way of teaching skill and pedagogical knowledge. Already in Table I the qualities have been arranged in order roughly from those which are most innate to those almost entirely due to training. Picking out from among them those with anything more than trivial values, which at the same time are fairly permanent features of character not much susceptible to training, and neglecting those attributes which may still be acquired under favourable circumstances in the years of education which remain, we find ourselves left with just ten qualities. Six of these have been evaluated at percentages between 7 and 9 (Diagram I) and the remaining four roughly between 3·5 and 5. A simplified and

abbreviated scale whereby head masters and others might make reports on the prospective value of pupils intending to become teachers suggests itself in the following form.

Intelligence	points out of	10
Personality and Will ..	,, ,,	10
Sympathy and Tact ..	,, ,,	10
Open-mindedness ..	,, ,,	10
Sense of Humour ..	,, ,,	10
Idealism	,, ,,	10
Kindness	,, ,,	5
Enthusiasm	,, ,,	5
Perseverance	,, ,,	5
Self-control	,, ,,	5
TOTAL	,,	80

Of these qualities intelligence alone could be objectively estimated. In an intelligence test survey of the students at Exeter* the average I.Q. for unselected, two-year, certificate students was 115·9 with one half of the cases falling between 111·5 and 126·0; for post graduate diploma students the average stood at 130·5 with the inter-quartile range from 126·25 to 134·0. We have known no case of a successful teacher with an I.Q. of less than 100, but we have measured several moderately successful teachers at or just above that figure.

In the application of this scale to candidates for training colleges the same difficulty of getting a standard is encountered, and in this case there is no means of providing an average outside the conception of normality resident in the mind of the assessor. The best procedure would clearly be for the training college staffs to interview specially those candidates receiving the lowest scores (among the small group in each school) from the head masters.

IX.—SUMMARY OF MAIN RESULTS AND SUGGESTIONS.

(1) It is possible to arrange the qualities demanded of teachers in the form of a limited number of psychological traits and acquired habits manifesting relatively little overlap among themselves. Of the twenty-two attributes which constitute the irreducible personality qualities revealed in this research, the first twelve in order of importance are: Personality and Will, Intelligence, Sympathy and Tact, Open-mindedness, Sense of Humour, Idealism, General Culture, Kindness,

* "Intelligence Levels in Schools of the South West." *The Forum of Education*, VIII, Nov., 1930.

Enthusiasm (for the job), Knowledge of Psychology and Pedagogy, Class-room Technique, and Perseverance-industry. (The " breadth " of the meaning assigned to each of these labels is indicated in Table I.)

(2) The qualities demanded of the young teacher (about to leave college) do not differ essentially from those expected of the good mature teacher. On the whole, enthusiasm, energy, social fitness, and presence are especially demanded of the young teacher, and greater skill, knowledge, intelligence, sympathy, and tact of the mature teacher.

(3) There is quite a fair agreement among the various branches of the teaching profession as to the order of importance of these components of personality. At the same time there are some significant divergences of opinion which appear to be related to the particular angles from which the various professional groups view the teaching process and to the particular demands made upon each group by its own peculiar variety of teaching. Thus, e.g., Training College Staffs stress intelligence ; Inspectors, orderliness, open-mindedness, and good presence ; Infant Teachers, sympathy, tact, and perseverance ; Pupils, leadership, justice, sympathy, and tact.

(4) There is a very good agreement of men and women educators as to the general qualities which go to make a good teacher.

(5) The results for all women respondents are almost in entire agreement with those for all men in regard to the qualities which are believed normally to distinguish the young male from the young female teacher. The distinction includes, e.g., greater conscientiousness, refinement and pride in social graces among women ; greater sense of humour, sense of proportion, and planning capacity among men.

(6) A survey of previous researches shows that the opinions of pupils have been extensively studied by questionnaire and indirect methods, with a resulting crop of highly concordant results. The views of educators have received almost equal attention and been subjected to statistical treatment, but, partly owing to insufficient psychological analysis, and partly because of a confusion of the planes on which teaching ability can be studied, the results have not been profitable in proportion to the work expended on them. A beginning has been made with more truly objective methods of measuring teaching ability and discovering the causes of failure and success, particularly with regard to the part played by intelligence.

(7) A rating scale for the assessment of teachers about to leave college is put forward, in which the candidate is judged, on a five point scale, on each of the twenty-two attributes, and receives his final score from a summation of the items, each item having been weighted according

to the value discovered for it in the statistical survey. The assignment of points, both in the items and the final teaching mark, is determined by the application of a normal distribution frequency to a straight ranking of a sufficiently large number of students. The validity of the scale is increased by fixing " minimum values " for each separate item.

(8) An abbreviated and simplified scale, embodying only those qualities in the larger scale which are but little susceptible to education, is suggested for use in the selection of teachers from among pupils leaving school.

This concludes the result of an enquiry in which we have tried by a laborious method, but one beset with certain imperfections, to develop a sounder foundation for estimates of teaching ability and worth. It is possible that the two concrete suggestions for rating scales put forward will not everywhere meet with favour or will prove in practice to require considerable modification. Even so there will remain much of practical value in these results. They will assist the teacher in self examination, in the analysis of his own faults, both as they are likely to strike his pupils and as they must appear to others. They will be a guide to the intending teacher and the student in training, pointing out to him the qualities that he is expected to develop. Workers in different branches of education will find in them a means of studying each other's viewpoints. Finally, as a carefully balanced survey of all branches of professional opinion, the results will provide those engaged in the assessment of teachers with surer standards and a detailed scheme of reference for analysing the strong and weak points of those in their charge.

Professor Watkins, who began this research in company with the writer and was forced by pressure of work to abandon active participation, hopes to complete the research by working out the questionnaire material already gathered in regard to the qualities demanded in the various specialist teachers. The rating scale is also being tried out at University College, Exeter, under Dr. Watkins' supervision, and a report will be made on it in due course.

The writer wishes to express his gratitude to all those who gave such evident care and thought to preparing the valuable and frequently very extensive replies to questionnaires; he regrets that he has not been able to give more complete expression to many highly interesting features of the individual reports. Particularly he would like to thank Miss M. Robins, a post-graduate student of the Department, who pursued one branch of the research as part of a special professional study, and whose industrious and skilful assistance made possible an early completion of the enquiry.

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RÉSUMÉ.

L'ÉVALUATION DES APTITUDES POUR L'ENSEIGNEMENT.

Un questionnaire, distribué parmi les directeurs, les inspecteurs, le personel des écoles normales, les professeurs, les instituteurs et institutrices, et les élèves des écoles secondaires, ceux qui sont spécialement destinés à l'enseignement et les autres, leur demanda de fournir une liste des dix qualités les plus importantes pour le bon professeur (a) le professeur tout jeune (au moment de sortir de l'école normale); (b) le professeur d'âge mûr.

Les résultats des 254 réponses, analysés du point de vue statistique, donnèrent vingt-deux traits psychologiques distincts dans l'ordre suivant d'importance:

Personnalité-volonté, intelligence, sympathie et tact, largeur d'esprit, sens du comique, idéalisme, culture générale, bonté, enthousiasme, connaissances en psychologie et pédagogie, technique de l'enseignement, application-persévérance, maîtrise de soi-même, esprit entreprenant, esprit d'ordre, connaissance des sujets, intérêts non-professionels, santé physique, maintien, vivacité d'intelligence, position sociale, esprit conservateur.

Les opinions des différents groupes professionels montraient un accord assez complet, celles des hommes et des femmes un accord presque parfait.

Sur ces données on propose une échelle et un procédé pour évaluer (a) les capacités des élèves sortant des écoles normales; (b) celles des candidats se présentant pour entrer à ces écoles. On donne un résumé des recherches antérieures et une bibliographie comprenant 43 titres.

AUSZUG.

DIE ABSCHÄTZUNG DER LEHRFÄHIGKEIT.

Ein Fragebogen, den man Direktoren, Inspektoren, dem Lehrpersonal in pädagogischen Instituten, Leitern und Assistenten in höhern Schulen, Volks-und Kleinkinderschulen, Studienreferendaren und Schülern zukommen liess, verlangte von jedem Antwortenden, dass er die zehn wichtigsten Eigenschaften des tüchtigen Lehrers geben sollte (a) wenn er jung ist (beim Abschiednehmen vom pädogogischen Institut); (b) wenn er erfahren ist.

Die statistisch behandelten Resultate von 254 Antwortenden gaben zweiundzwanzig nicht übereinandergreifende psychologische Züge in der folgenden Reihe der Wichtigkeit: Persönlichkeit-Wille, Intelligenz, Mitleid und Takt, Offenherzigkeit, Humor, Idealismus, allgemeine Bildung, Freundlichkeit, Enthusiasmus, psychologische und pädagogische Kenntnisse, Technik des Klassenzimmers, Beharrlichkeit-Fleiss, Selbstbeherrschung, Unternehmungslust, Regelmässigkeit, fachmännische Kenntnisse, Beschäftigungen ausserhalb der Schule, körperliche Gesundheit, vornehme Persönlichkeit, Scharfsinn, gesellschaftliche Tauglichkeit, und Konservatismus.

Die Meinungen der verschiedenen fachmännischen Gruppen zeigten verhältnismässig gute Übereinstimmung; diejenigen von Männern und Frauen sehr gute Übereinstimmung.

Infolge dieser Ergebnisse wird einen brauchbaren Massstab und eine mögliche Verfahrungsart angeboten, womit man (a) Lehrer, die vom pädagogischen Institut weggehen, und (b) Kandidaten, die auf pädagogische Institute gehen, abzuschätzen vermag.

Eine Übersicht vorhergehender Forschung und ein Bücherverzeichnis von 43 Titeln werden gegeben.

EXAMINATION AND INTELLIGENCE-TEST FORECASTS OF SCHOOL ACHIEVEMENT.

By A. DONALD AMOS

(*From the Education Department, University College, Cardiff*).

I.—*The problem*:
Selection of candidates for admission to secondary schools.
II.—*Administration and character of the tests.*
III.—*Data available*:
Relative standing of admitted candidates in (i) the Entrance Examination, (ii) the Tests, (iii) the School-groups in various years.
IV.—*Correlations—first-year results.*
Table, summary, inference.
V.—*Partial correlations in the two largest groups—first year.*
Table, notes upon implications of the coefficients, inferences.
VI.—*Correlations—Second-year results.*
Table and inference.
VII.—*Partial correlations in the largest group—second year.*
Table and inference.
VIII.—*Some comparisons of first, second, and fourth-year progress.*
Table and inferences.
IX.—*Previous investigations of correlated problems.*
X.—*Conclusions drawn from the present investigations.*
(*a*) *Relative accuracy of forecast of secondary school achievement by the ordinary examination and by the intelligence tests.*
(*b*) *Forecast by pooling intelligence and examination scores.*
(*c*) *Relative interdependence of abilities measured by (i) examination, (ii) the tests, (iii) school standing.*
(*d*) *Possibility of variation of factors determining success in different years of the school career.*

I.—The problem.

In secondary schools where the pupils are admitted on the results of a competitive examination, it is very often found that the subsequent performance of the pupils fails to tally with the forecast made by the

examination; sometimes to such an alarming degree that the teachers feel that they are not getting the best material, that some poorer candidates are being admitted, to the exclusion of children better qualified to profit by the type of education which their schools provide.

That there should be differences between the examination forecast and the actual secondary school form-standing is no matter for surprise. These schools have an established educational tradition, determined largely by the nature of the school-leaving examinations for which they prepare their pupils, and also by the more advanced age of the scholars themselves. Most of the candidates for admission are children who have been attending elementary schools. When they enter the new school they find a curriculum in part familiar, but to a considerable extent strange to them; and often the methods of study are different from those to which they have been accustomed.

These conditions indicate the type of child who will do best in the secondary school: he will have a sufficient grounding to do well in familiar subjects, and will be adaptable enough to take kindly to comparatively strange subjects and to new methods.*

The present article is a brief summary of some of the results obtained in an investigation into the problems involved in this state of affairs.

The question to which we attempt to provide an answer is this: Which will give the forecast of secondary school progress in closest accord with ascertained fact—the old type of examination in arithmetic and English, or specially devised group tests of intelligence, or a combination of the two?

II.—Administration and Character of the Tests.

The investigation was conducted in a large county area, mainly industrial in character. In this area all candidates for admission to secondary schools sit the same examination. At the time of the enquiry, scholarships and places were awarded upon the results of an examination in arithmetic and English. This was supplemented, for purposes of investigation only, by a group test of intelligence; the marks scored in the intelligence test were not counted in the award of places.

More than 2,000 children were examined in this way. The ages ranged from $10\frac{1}{2}$ to $14\frac{1}{2}$ years, the median age being $12\frac{1}{4}$. The candidates were distributed in many examination-centres, and the usual means of

* Cf., Dobson, "The value of intelligence tests in scholarship examinations," *Forum* I, page 53.

obtaining uniformity of procedure were adopted, namely, printed booklets of the tests, in which the candidates were required to record their answers to the " intelligence " problems, and detailed instructions to supervisors.

The intelligence tests employed were of kinds which have proved, in the hands of other investigators, to be of high diagnostic value. They consisted of Number Series, Absurdities, Number-Substitution, Analogies, Reasoning, and Proverbs.

In the Number-Series Test the candidate was required to add the next two terms to a given sequence, e.g.,

2	2	3	3	4	4	...	...
1	7	2	7	3	7	...	...

In the Absurdities Test he had to cancel a word or more, or a portion of a word, so as to reduce an absurd sentence to a sensible form, e.g.,

" She watched the ship until it was no longer invisible."

The Number-Substitution Test was of the type employed in the American Army Series. The first line of the test is given :

1	m	1	3	2	3	1	4	2	t	4	3	5	4	x	5	k	3	m	t
x	2		s				k		5										

The well-known Analogies Test needs no description. A choice of four alternatives was given, from which the fourth term had to be selected.

The Reasoning Tests were similar to some employed by Burt. They involved comparison (" larger—smaller," etc.) and classification of this type :

" A, B, C, and D are wild-flowers. A and B grow only in sandy soils, C and D only on limestone. A and C grow only on mountains, B and D only in valleys.

" My home is in a sandy valley : I have sometimes found ..... growing there."

" In the Proverbs Test, ten well-known proverbs were given : below, numbered paraphrases were given. The candidate was required to show which paraphrases fitted which proverbs.

The tests were marked according to a rigid scheme, but any indication of correct intention was scored as correct, and no deductions were made for wrong answers or unattempted questions. Every candidate had the same time for each of the tests separately.

The range of marks obtained showed that the tests were adequate for the purposes of selection, and suitable to the age of the examinees.

III.—Data available.

Of the candidates examined, about one-third obtained places in the secondary schools. The marks obtained by these children in the intelligence tests were available, and from various sources it was possible to obtain their marks in the arithmetic-English examination. At the end of the first secondary school year the head teachers kindly supplied their marks or ranks, either in the school-group, or, more often, in the form-group. Unfortunately the splitting-up of the subjects of the investigation into small groups greatly reduced the extent of the significant statistical field for research. The records of more than 270 pupils, constituting seven school or school-form groups, provided material of sufficient significance for our purpose.

Throughout the investigation the raw-scores in the various examinations, etc., without any allowance for age-differences in the pupils, have been employed. This course has been determined by considerations of administrative custom in the area concerned, and by the organization of the secondary schools, where pupils of ten to thirteen years of age, admitted by the same entrance examination, are found in the same school forms. In such circumstances it is clear that school standing will be affected by mental and scholastic age rather than by the corresponding quotients. Our procedure, arising from the consideration that we were engaged in the investigation of a problem under conditions prescribed by the existing system, does not imply that we defend a system of admission in which no credit is given to younger candidates.*

The crude data were thrown into the form of relative ranks. As might be expected, there were considerable divergences between the various pairs of ranks so obtained. The rank a obtained in the entrance examination, and the rank b obtained in the intelligence tests are compared with the rank c of school-performance, which is to be taken as the standard by which the accuracy of the forecasts a and b are to be judged. A third alternative presents itself: the mark % in the arithmetic-English examination and the mark % in the intelligence tests are combined, and another forecast resulting in rank q is obtained: this is also compared with c. By the usual methods, Spearman's R and the Bravais-Pearson r are obtained.

* The bad effects of such a system are shown, for example, by Sandon, *Forum*, VI, 70, and VII, 23.

IV.—CORRELATIONS—FIRST-YEAR RESULTS.

The following table gives the correlations between the various forecasts and the school standing at the end of the first year's work in the secondary schools for the seven groups mentioned above.

Group.	n	r_{ac}	r_{bc}	r_{qc}
Mq	30	·43	·50	·53
Km	30	(·19)	(·26)	·34
Ea	31	·31	·32	·37
Hk	32	(·26)	·35	·43
B	33	·47	·44	·57
C	48	·29	·41	·40
D	70	·35	·49	·54

a=Forecast by entrance exam. in English and arithmetic.
b=Forecast by intelligence tests.
q=Forecast by entrance exam. and intelligence tests combined.
c=Actual achievement at end of first secondary-school year.
n=Number of pupils constituting the group.

With the three exceptions, marked by inclusion within brackets, (...), these values are all greater than 3PE.r, and therefore significant.

In every instance, r_{qc} is higher than r_{ac}.

With one exception in school C, r_{qc} is also higher throughout than r_{bc}.

With one exception in school B, r_{bc} is throughout higher than r_{ac}.

Transposing these results into verbal form, we see that the intelligence tests, alone, make a more accurate forecast of first-year secondary school standing than does the arithmetic-English examination. A combination of the two, test with examination, affords a better means of prognostication than either separately.

V.—PARTIAL CORRELATIONS IN THE TWO LARGEST GROUPS—FIRST YEAR.

The correlations between pairs of three variables are often affected by the influence of the third variable. Thus the correlation between entrance examination success and secondary school standing may be due in part to factors entering into the intelligence tests, and so, *mutatis mutandis*, for the other pairs. The method of partial correlation gives us a means of estimating the amount of this interference, by holding constant the third variable, and showing the degree of interdependence then remaining between the two variables whose true relation we wish to assess.

The following results are obtained by treatment of the data from the two largest groups, namely, the seventy pupils in school D and the forty-eight in school C.

The abbreviations employed here and in the discussion which follows denote :

E = Exam. = All abilities making for success in the entrance exam.

I = Int. = All abilities making for success in the intelligence tests.

S = Schol. = All abilities making for success in the first year's work in the secondary school.

Correlations between	*Value.*	*Eliminate.*	*Partial.*	*Difference.*
SCHOOL D.—70 PUPILS				
Exam. and Schol.	·36	Int.	·24	·12
Int. and Schol.	·49	Exam.	·42	·07
Exam. and Int.	·34	Schol.	·20	·14
SCHOOL C.—48 PUPILS.				
Exam. and Schol	·29	Int.	·22	·07
Int. and Schol.	·43	Exam.	·39	·04
Exam. and Int.	·23	Schol.	·12	·11

We are concerned with the Entrance Examination (E) and the Intelligence Tests (I) as measures of Secondary School Achievement (S). The indications are similar in both schools.

(1) E serves as a measure of S ; so does I ; and E and I are measures one of another. This follows from the original or " observed " correlations.

Now if the three examinations, etc., upon which the three orders of merit of these pupils were based, measured exactly the same abilities in exactly the same way, we should expect almost perfect correlations between the three pairs ES, IS, EI. In that case the present investigation would have been pointless, since a well-nigh perfect means of prognostication of S would already have existed in E, and in effect I would be merely an alternative and redundant form of the same examination.

Actually we find the measures far from perfect, but at least good enough to give us a clear indication of tendency. Moreover the mutual measures of pairs of the groups of abilities, E, I, S, are not equal one to another. The question then arises, to what extent are these measures dependent one upon another ?

Supposing, for the sake of illustration only, that we were to find that I and E measure the same group of abilities, or that E measures

the abilities of I together with other abilities not measured by I, then the case for the intelligence tests would fall to the ground, whatever the degree of correlation between I and S. In fact, the less these two forecasts E and I have in common, the greater the force of the argument for the inclusion of both of them in our methods of selecting candidates, since each serves as a measure of secondary school success.

The answer to the question formulated and elaborated above is to be found in the partial correlations and the differences between partial and original correlations already tabulated.

(2) Apart from abilities already measured by E, I affords a measure of S; and apart from abilities already measured by I, E affords a measure of S. These measures are large enough to warrant the inclusion of both E and I as means of forecasting S, the implication being that there are groups of abilities making for school success which are measured by E and not by I, and other such groups measured by I and not by E.

(3) E and I measure each other to a less degree than each measures S, as is shown by the original correlations. When we eliminate the measurement of abilities affecting S, the degree of common ground between E and I becomes very much smaller. This implies that many of the abilities common to E and I are common to S as well; but also, since the total common measure of E and I is less than the measure of S by either E or I, this twice-measured group of abilities, or factor common to all three, is relatively small.

(4) The measure of S by I apart from abilities measured by E is much greater than the measure of S by E apart from abilities measured by I.

This emphasizes the conclusion at which we have arrived upon other grounds, that of the two forms of examination separately, the intelligence tests give the better forecast of secondary school progress, at least so far as the first year's work is concerned.

. . . . .

From the foregoing analysis we have strong grounds for recommending the inclusion of intelligence tests in entrance examinations for admission to secondary schools. If we have to choose one or the other, then the intelligence tests are preferable to the usual arithmetic-English examination; but the strongest arguments of all advocate the inclusion of both types of examination.

VI.—CORRELATIONS—SECOND-YEAR RESULTS.

By the end of the second year from admission to the secondary schools, a large number of children had left. Consequently the difficulty

of small statistical groups was greatly increased. In addition to this, further selection factors had been at work, owing to promotions and retardations of children in many of the school groups. There remained four groups only of fair size.

In the case of school K, the ranks were given for school-year standing, instead of school-form standing as in the first year.

The data were treated as before. A summary of results is given in the following table :

Group.	n	r_{ac}	r_{bc}	r_{qc}
Mq2	30	·43	·50	·50
K2	48	(·24)	(·16)	·29
C	48	·57	·50	·58
D2	37	(·07)	(·24)	(·24)

The correlations are bigger than 3PE.r, and significant, except in the cases bracketed, as before.

It will be seen that on the whole there still remains a margin of accuracy of forecast in favour of the " combined marks " (q) method. We must be guarded in any conclusions drawn from correlations of a low order. The results from groups C and Mq2 are reliable, and support the modest inference we have drawn ; and the feebler evidence of the other groups points in the same direction.

While the " combined marks " method receives support from the data available, however, the intelligence tests by themselves do not maintain the distinct advantage they had in the first year. The averages of the correlations indicate that, at all events, the forecast of second-year standing made by the tests is no worse than the forecast made by the entrance examination.

It is possible that during the first year of life in a secondary school, with its elements of novelty in both the matter and the methods of education, the more intelligent children, owing to their greater adaptability, do better than the children whose progress depends upon character traits such as perseverance ; and when all have had time to become acclimatized to the new conditions, the hard workers regain the lost ground. Or it may be that the teaching methods of the second year are different, tending to favour the plodder rather than the brilliant but less stable child.*

*A similar effect was found by Rogers in her enquiry into the progress of university students. She attributed it to the dropping-out of the mentally-inferior students ; possibly some such selection-factor is here at work.
See "Mental tests for university students," *B. J. Psy.*, XV, 410.

Such variations of circumstances might account in part for the changes observed, but it is quite impossible to attach more than a speculative value to these surmises.

VII.—PARTIAL CORRELATIONS IN SCHOOL C—SECOND YEAR.

The group C above is the only group which is identical with the corresponding first-year list. In this case, therefore, a direct comparison of the correlations obtained in the two years becomes possible. Fortunately the number of cases considered in this school is large. Working out the partial correlations, with the same notation as before, we obtain the following remarkable information.

	Original correlation.	*Elim.*	*Part. corr.*	*Decrease.*
Exam. and Schol.	·58	Int.	·49	·09
Int. and Schol.	·50	Exam.	·48	·02
Int. and Exam.	·23	Schol.	·12	·35

It is evident that the correlation between Exam. and Int. depends entirely upon abilities making for second-year school success (Schol. in this case referring to the second year).

The relation between Int. and Schol. (2nd) is practically independent of abilities measured by Exam., but the relation of Schol. (2nd) to Exam. depends to some extent, though comparatively small, upon abilities measured by Int.

In addition we note that the independent parts played by Exam. and Int. in the measure of second-year school abilities are almost exactly equal.

From this we conclude :

(1) That the necessity for including both intelligence tests and papers in arithmetic and English in the selective examination is re-emphasized by the second-year results ; and

(2) That second-year results apparently do not depend upon exactly the same abilities as first-year results.

VIII.—SOME COMPARISONS OF FIRST, SECOND, AND FOURTH-YEAR PROGRESS.

In order to obtain any definite information with regard to variation in prognostic value of the criteria of forecast, it is necessary to examine the progress of children whose names have appeared in the same

group-lists in each of the years considered. This will materially reduce the size of available groups, but no other procedure is possible, since we have no means of equating standing in one group with standing in a different group.

The number of such groups with more than twenty subjects is only two. The analysis is concerned with the relative school standing of these pupils in successive years, as compared with the three forecasts made before the beginning of their secondary school careers.

Group.	n	*1st Year.*			*2nd Year.*			*4th Year.*		
		r_{ac}	r_{bc}	r_{qc}	r_{ac}	r_{bc}	r_{qc}	r_{ac}	r_{bc}	r_{qc}
C4	36	·31	·49	·40	·55	·57	·68	·24	·35	·35
D4	26	·23	·51	·51	·07	·26	·23	·26	·62	·62

On the whole, the intelligence tests give a better picture of the subsequent school career than is afforded by the entrance examination, and on the whole the best forecast of school progress is given by combining the marks of the tests with those of the examination in arithmetic and English.

The only unreliable coefficients in group C4 are those involving the entrance exam. standing, years 1 and 4.

In the group D4, the results are not highly reliable in the second year; in the first and fourth years the tests and the pool give equally good forecasts, much better in each case than the entrance examination; and again the coefficient involving the exam. falls below reliability-level.

The general trend of this evidence seems to point to the following tentative conclusions, some of which receive support from other sources.

(1) The relative prognostic value of the tests and the examination of the ordinary type varies from year to year of the school life.

(2) The pool of tests with examination marks maintains its advantage throughout, though less markedly, in the second year, than in the first and fourth.

IX.—Previous investigations of correlated problems.

When we consider the amount of attention that has been devoted in recent years to intelligence testing and to school examinations of various kinds, it is remarkable that so little has been done to compare examination forecasts with the subsequent school records of admitted

candidates. Even when such comparisons have been made, the scientific value of the results has often been reduced by giving the reports upon school achievement in the form of subjective estimates, as, " these pupils are all doing satisfactory work," with no comparative measure of the degree of satisfaction.

Turning to the Board of Education Report upon *Psychological Tests of Educable Capacity*, Appendix II, we find accounts of experiments in Blackpool, Bradford, Northumberland, Cheltenham, the West Riding, London, and Rugby, bearing upon our general problem. From other sources we learn of experiments in Newport (Mon.), Brighton, and the Isle of Wight, all concerned with the question of admission examinations.

In the West Riding and the Isle of Wight,* interesting sociological information has resulted from the investigations, but we have found no published record of the secondary school achievement of the children providing the data.

The main interest of the well-known Northumberland investigation lay in the discovery of intellectual lights concealed under remote rural bushels, and in the impetus given to modern methods of examination. The subsequent reports are concerned mainly with individual instances, bearing evidence to the soundness of the tests as a criterion of forecast, but not affording a real parallel with our present investigation.†

Stepney and Mile End show the value of the tests for grading purposes, but do not otherwise touch our problem.

Rugby correlates intelligence with scholastic standing, but is not interested in admission examinations.

At Bradford in 1922 intelligence tests were taken into account in borderline cases. The records were followed up, and the Director's report shows that a better forecast of school terminal marks was made by the intelligence tests than by the ordinary scholarship examination. The number of children concerned was ninety-two.

At Blackpool in the same year, experiments were conducted with several types of intelligence tests. The Director expresses his opinion, based upon the subsequent work of thirty children in secondary and 240 in central schools, that the tests did assist in the discovery of educable capacity, and that they may with profit be combined with, but cannot displace, the ordinary scholastic examination for the awarding of scholarships.

* MacDonald, " The social distribution of intelligence in the Isle of Wight," *B.J.Psy.*, XVI, 123.

† Thomson, " The Northumberland Mental Tests," *B.J.Psy.*, 1921, and Russell, " Measurement of intelligence in a rural area," *B.J.Psy.*, XX, Jan., 1930.

In an account of an experiment at Cheltenham with individual tests, Dobson* finds that they give valuable information for the decision of borderline cases. The differences in teaching in elementary schools render intelligence tests desirable as an addition to the written examination, providing a means of detecting both the mentally poor but heavily coached boy and the mentally bright but poorly taught boy. Dobson contends that attainment and ability are both necessary to school success, and that therefore the written examination must be retained: an opinion which our own conclusions substantiate. In a later investigation* with group tests, he again finds considerable agreement between the intelligence forecast and secondary school standing.

The closest approach to the form of our investigation is reported by Oates,† who has compared fourth-year standing, in a Newport secondary school, with the admission examination and with intelligence tests. His conclusions are in some respects similar to our own, but in other respects divergent from them.

Oates finds both the tests and the examination necessary as measuring different abilities connected causally with school success; thus agreeing with the expressed opinion of Dobson, Ikin, and others, and with our own conclusions. He also finds, as we do, that pooling the tests and the examination gives a slightly better forecast than either taken separately; but he hesitates to recommend this course, preferring, with many other investigators, to reserve the intelligence tests for "the analysis of special cases." In this he is probably influenced by finding, contrary to our own conclusions, that on the whole a better forecast of school standing in the fourth year, which may be regarded as the critical year of school life, is given by the entrance examination than by the intelligence tests.

X.—Conclusions drawn from the present investigation.

(*a*) Comparing the forecasts of secondary school performance afforded by the examination in arithmetic and English and by the intelligence tests, we find the tests nearer to the observed facts. This advantage is most marked in the first year of secondary school life. In the second year there is little to choose between the two forecasts: but there are some indications that the advantage of the tests is re-established in the fourth and critical year.

* Dobson, "The value of intelligence tests in scholarship examinations," *Forum of Education*, I, 53; and "An investigation of group intelligence tests," *B.J.Psy.*, Oct., 1924.

† Oates, "Predicting school achievement," *J. of Educ.*, Aug., 1929.

(*b*) Throughout the secondary school career, the best forecast of school standing is made by pooling the marks of the tests with the marks of the ordinary examination. This supports the view that school progress depends upon both native ability and special training. It does not, of course, prove that these are the only factors making for success.

(*c*) We have shown that the abilities measured by the intelligence tests are not the same as those measured by the ordinary examination, and that the common ground between the tests and the examination is not so great as might be supposed. We have further shown that both the examination and the tests measure abilities which play an important part in the determination of school success, and that they measure these abilities independently one of the other, that is to say, that they measure different groups of important abilities.

This substantiates the conclusions stated in (*b*) above.

(*d*) There is reason to suppose that the factors determining school standing vary from year to year of school life. Prognostication of the whole school career is thereby rendered more difficult, but our results support the general conclusion that the pooling of intelligence scores with examination marks gives a better forecast than either intelligence scores or examination marks considered separately. Further research into the variation of the factors of success in the different years of school life is required.

. . . . .

The perfect examination is still a long way off; the best we can hope for in the immediate future is a measure of improvement upon old methods proved to be inadequate. The results of this investigation serve as an additional pointer towards such an improvement. Meanwhile, our chief need seems to be the substitution of scientific principle for prejudiced or unsupported opinion; and this can only be achieved through further research in the schools.

RÉSUMÉ.

L'EXAMEN ET L'ÉPREUVE D'INTELLIGENCE COMME BASE DE LA PRÉDICTION DES APTITUDES SCOLAIRES.

La position relative des enfants, admis aux écoles secondaires, pendant différentes années de leur vie scolaire est comparée avec des prédictions basées sur (1) les résultats de l'examen d'admission en arithmétique et en anglais, (2) les résultats des épreuves d'intelligence par groupes, (3) une combinaison de (1) et (2). Il en ressort que (3) donne la prédiction la plus juste, tandis que (2) est légèrement supérieur à (1).

L'examen et les épreuves cependant, mesurent des groupes fort divers des capacités essentielles au succès à l'école. La conclusion générale en est que les épreuves sont très utiles dans les examens d'admission mais qu'elles ne peuvent remplacer l'examen ordinaire.

On considère la possibilité d'une variation dans les influences qui contribuent au succès dans les différentes années de la vie scolaire.

ÜBERSICHT.

PRÜFUNGEN UND PROBEN DES VERSTANDES ALS VORAUSSAGEN VON ERFOLG IN DER SCHULE.

Die relativen Stellungen, in verschiedenen Jahren des Schullebens, von Kindern, die auf höhere Schulen gegangen sind, werden mit den Voraussagen verglichen, die (1) aus der Zulassungsprüfung im Rechnen und in der englischen Sprache, (2) aus Proben des Verstandes für Gruppen und (3) aus einer Vereinigung von (1) und (2) zusammengestellt wurden. Man hat entdeckt, dass (3) die zuverlässigste Voraussage bietet, während (2) (1) etwas überlegen ist.

Prüfungen und Proben aber messen verschiedene Gruppen der Fähigkeiten, die dem Erfolg in der Schule unentbehrlich sind. Im grossen ganzen schliesst man daraus, dass Proben des Verstandes in Zulassungsprüfungen sehr wertvoll sind, aber sie können die gewöhnliche Art des Examens nicht verdrängen.

Die Moglichkeit von Veränderung der Faktoren des Erfolges in verschiedenen Jahren der Schulzeit wird angedeutet.

AN ANALYSIS OF THE MOTIVES OF ADOLESCENTS FOR THE CHOICE OF THE TEACHING PROFESSION.

By FRANCES M. AUSTIN

(*The Education Department, The University, Birmingham*).

I.—*Description of the investigation.*
II.—*Results of the analysis of replies.*
III.—*The popularity of different reasons.*
IV.—*Influence of adults, particularly of teachers.*
V.—*Reluctance of some children to grow up.*
VI.—*Striking results from the papers of the children aged* 15 *years to* 15 *years* 11 *months.*
VII.—*The factor of expediency in choosing a vocation.*
VIII.—*The desirability of more definite guidance.*
IX.—*Summary of results and conclusions.*
X.—*Samples of children's answers to illustrate the standard taken in marking.*

I.—Description of the investigation.

A few years ago Professor Valentine initiated in the Midlands an investigation designed to find out what reasons were influencing children in secondary schools in their choice of vocation. The investigation was carried out in five schools and some of the results have already been published.*

Eleven hundred and five children altogether were examined, five hundred and fifty-seven boys and five hundred and forty-eight girls. These children were asked to tell what vocations they hoped to adopt, and the reasons for their choice. Strict anonymity was promised and this may partly account for the candour of many of the replies. Most of the children were between twelve and eighteen years of age; some were between eleven and twelve; a few were between eighteen and nineteen.

* *The Forum of Education.* Vol. V. No. 2.
The Forum of Education. Vol. VIII. No. 1 and No. 2.
The Journal of the National Institute of Industrial Psychology. Vol. IV. No. 4.

The percentages of children choosing various occupations are shown below.

TABLE I.

	Boys.	*Girls.*	
Total number.. ..	557	548	
	Per cent.	*Per cent.*	
Teaching	10	42	
Office	15	22	
Drawing	9	3	
Chemist	10	·2	
Engineering	29	0	
Nursing	0	4	
Farming	3	2	
Carpenter	3	0	
	79	73·2	
45 other vocations ..	21	26·8	39 other vocations.
	100	100·0	

Two hundred and eighty-four children chose the teaching profession, and it has seemed worth while to consider separately the papers written by these children, and to analyse the reasons they gave for their choice.

II.—RESULTS OF THE ANALYSIS OF REPLIES.

The teaching profession was more popular with the girls than with the boys. Only ten per cent of the boys compared with forty-two per cent of the girls hope to teach.

As might be supposed, the exceptional opportunity the profession offers to girls is often mentioned. Many girls of sixteen or seventeen years of age were definite on this point. For example, one writes : "The teaching profession is well-paid and is to-day the quickest and best way for a schoolgirl to earn her living. I must earn a living, and that as quickly as I can, for I have sisters and a brother to come after me, but if I were rich and could do what I liked most, I should not teach."

There may be other reasons for the high percentage of girls, but undoubtedly this one occupies an important place.

Samples of the answers are appended. They varied greatly, even with children of the same age. When each paper was marked carefully for soundness of reasons given, three groups were formed, thus :

TABLE II.

Age.	*Good or satisfactory.*	*Only fairly satisfactory.*	*Unsatisfactory.*
	Per cent.	*Per cent.*	*Per cent.*
17 years	44	21	35
16 years	40	26	34
15 years	32	9	59
14 years	25	12	63
13 years	6	11	83
12 years	4	4	92
11 years	0	4	96

It is no surprise to find a high percentage of poor reasons given by the younger children. It is more serious when the older children give poor reasons. In one school of high standard in academic and general work, sixteen out of eighteen girls of average age nearly eighteen years, and in the sixth form, gave teaching as their future profession, but only four seemed to have considered the situation seriously and intelligently, realizing the essential qualities of a teacher, and the conditions under which the work is done. Reference to the samples will show that the standard taken was not high and that far more could be expected from girls of this age. The record for the fifth form is even worse. Of eighty-seven girls of average age fifteen years and four months, twenty expected to become teachers but only two of them gave good and adequate reasons for their choice.

III.—THE POPULARITY OF DIFFERENT REASONS.

Table III shows the most common reasons given by the children and the percentage of children who give them.

TABLE III.

Reasons.	*Percentage number of children.*
	Per cent.
Direct influence of relative or teacher ..	48
Relatives or friends in the profession ..	18
Indirect influence of teachers	10
Fondness for school subject	40
,, ,, teaching	26
,, ,, children	22
,, ,, school	12
Desire to continue education	15
Good salary	25
Philanthropic opportunities..	16
Easy (i.e., comfortable, short hours, etc.)..	22
Good holidays	21
Security	11
Nothing better to do	13

Nearly thirty reasons other than those given above were mentioned by smaller numbers of children. One or two of these additional reasons are of special interest and are considered later.

IV.—Influence of adults, particularly of teachers.

From the table it can readily be seen that, judged by the frequency with which it is mentioned, the strongest single influence of all is that of the adults with whom the children come into contact. The direct influence of relatives or teachers is the reason most often given at all ages except fourteen and fifteen. It comes second with the fourteen year old children, but only fifth with those aged fifteen.*

Obviously the advice of adults is indispensable. The children themselves often express appreciation of advice and encouragement. These are welcomed especially when there is no suggestion of compulsion, if, in fact, the children feel that the final choice is left in their own hands. But cases of what appears to be unreasonable pressure are only too common. Thus a boy of sixteen writes: "Some years ago my parents had made up their minds that I should be a teacher. It was only about a year ago that I agreed with them." Girls of seventeen are eloquent on this point. One made her decision to please her parents "after a great deal of hesitation," and adds "If I had been left entirely to my own wishes I should probably not have decided on teaching." Another found it "essential, as father's wish is law, and although he asked me what I wished to do, he would not have been satisfied with anything else." The father is not the only parent who exercises his prerogative. Mothers, some of whom have been teachers themselves, are quoted as insisting, in spite of protest, on their daughters becoming teachers, too. These are cases where children are forced to choose the teaching profession. There are other cases where those who want to teach are discouraged and refused the opportunity without acceptable reason. A sixteen year old girl writes: "When I was fifteen I thought I would like to teach little children, but mother and father both think I should not like it after a time. I also thought that the next best thing was to teach domestic science. Father thinks that is a girlish game, so I don't know quite where I stand."

Another girl, also aged sixteen, is hardly to be blamed if, eventually becoming a teacher or a clerk, she goes through life "with a grouse." She, herself, it seems to me, shows the right spirit. It is her seniors

* I.e., from fifteen to sixteen. The papers written by children of this age are exceptional in other ways and are considered more fully later.

who are wrong, though we must admit the possibility that they too would welcome outside help, provided, as with the children themselves, there was no suggestion of pressure or interference. This girl writes:

"Above all other suggestions I would prefer to become a lady doctor, but this I am afraid is out of the question. I should like this because I am very interested in medicine, physiology, and nursing. I once thought of becoming a nurse, but of this my parents disapprove, saying it is drudgery. Personally, I don't mind this at all, if I liked the work. The next thing in view is dispensing, but here again my parents disapprove of the hours, thinking also that I should not really like it, and that they know what I want better than I do myself.

"These suggestions have all been treated in turn and cast aside. I am now considering the work of a librarian, since I love books and literature. I should be happy in a reference library, but once again parents intervene with the notion that the hours are inconvenient, that I should not like it and would find it dull. What else remains? I am determined not to be forced into being a clerk in a bank or post office, which my parents think would be most suitable—such easy hours, leaving about five o'clock, and good pay. This would indeed be drudgery for me. Teaching remains, but I don't feel the slightest desire to instil knowledge into others. At present I have no ideas left, although there must be plenty of occupations or professions suitable. Whatever my work will be, I must be sincerely interested in it, and not longing for the end of each day as soon as it begins. I don't mind work or "drudgery" or small pay, but since others require a minimum of work and excellent pay for me, what can I do?"

Influence of Teachers.

The weapon teachers wield is a powerful one. Their enthusiasm argues for the profession, whether consciously or unconsciously, and many children reason thus: "My teachers seem to like it so it must be pleasant." The child-mind does not readily become conscious of the vitally important question: "Is it suitable for *me* with *my* particular gifts and failings?" Even if the question is framed the answer is hard to find.

Clearly as the children get older they become more observant and more critical of their elders, and amongst the papers of the older children comments on the influence exerted by their teachers become quite common. Two such comments are given below. The first was made by a boy, the second by a girl, both over seventeen years of age.

"Seeing and feeling the influence of a teacher over the desires and inclinations of the scholars I can see the immense possibilities open

to the teacher. ' The child is father of the man.' If the teacher influences the child's mind enough for good he will continue to be influenced when he is a man."

" Teachers have boundless influence, as I know from personal experience. They have influenced me both for good and for evil and have indirectly by their actions inspired in me the wish to imitate or the firm resolve never to act as they have done. In a word they have unconsciously strengthened my desire to adopt their profession."

Some of the children look forward with pleasure to the time when they too will exercise the same power. One girl of seventeen generalises to the effect that " the desire to dominate is present in most people and this is partly satisfied in a teacher's life." For another " the power of a teacher held magnetism " when she was young : " To sit at a desk, give orders to the children, and if necessary or not, to punish them, in short to be a veritable tyrant." This kind of power no longer fascinates her, but now she realizes " a little of what a great work a teacher's really is—to teach children and help mould their characters, and perhaps influence them all through their lives."

In Table III the figure 48 per cent represents the direct influence of adults shown in such statements as " my parents wish it " or " my teacher suggested it." There are several other related sources of influence. The general and often unstudied effect of the teacher has already been mentioned. It was given by ten per cent of the children. No doubt the teacher's influence is also reflected in such reasons as fondness for school subjects and fondness for school.

Another influence is that of relatives in the profession. In eighteen per cent of the papers we meet such statements as these : " It is almost a hereditary occupation with us " ; " I can hardly give an age when I decided upon teaching as I have been reared amongst a family of teachers, and I have always heard the people say, ' Shall you make a teacher of her ? ' "

Relatives in the profession can be of very great assistance, but there are two dangers. Children who are not definitely suited for the work may be given too much encouragement or even forced into the profession, and secondly, a narrow, secluded, limited life and outlook is the common danger where people of one profession congregate. Teaching is a profession in which even to-day an individual member can all too easily remain aloof from the world if he be so inclined. Yet to do his best work, especially with adolescents, a teacher must be in touch with the world and familiar with the ways of the world.

V.—RELUCTANCE OF SOME CHILDREN TO GROW UP.

Some children seem to be under the sway of the tendency not to grow up when they choose to be teachers. As they put it themselves, they " feel at home with children and out of place with their elders," and the teaching profession seems to them a refuge from a world of " grown-ups." We are reminded of that delightful essay of Charles Lamb where he writes of the old breed of school masters, " those fine old pedagogues " who passed from infancy to age dreaming away all their days as in a grammar school, while they renewed constantly " the occupations which had charmed their studious childhood, rehearsing continually the part of the past ; life must have slipped from them at last like one day. They were always in their first garden reaping harvests of their golden time . . . in Arcadia still, but kings."

There is little doubt that in the adolescent stage of development there is a tendency to cling to former phases of development and a reluctance to exchange them for new and unknown phases, at least until there is some assurance that the pleasures surrendered will be replaced by fresh equivalents.*

Six per cent† of the children's replies indicate a reluctance to grow up, and suggest that the teaching profession is sometimes chosen as a way of escape from the concomitants of maturity. A further two per cent are strongly influenced by the supposition that if they teach they need not go away from home. Another two per cent seem to have chosen the profession as a haven from a sense of fear. Altogether these make ten per cent who do not feel fitted to " face the world." Probably there are others—some of those who merely give " security " as a main reason for choice (eleven per cent), or some who are strongly influenced by their fondness for school (twelve per cent).

This reluctance to grow up must not be over emphasized. Normally, the forces in favour of growing up overwhelm the opposing conservative tendency and render it inconspicuous, if not entirely inactive. This seems to be true of the girl of seventeen who writes : " I expect I shall have to go away from home and at first I hated the idea. I could not imagine myself away from home for a very long time, but later I realized that I could not always stay at home, although frightened to leave it, and that I must learn to rely on myself and be able to take care of myself wherever I might be. And so now I can quite complacently

* See Ernest Jones. *British Journal of Psychology*. Volume XIII. Part 1. July, 1922.

† Half of these children were over sixteen years of age.

think of the time when I shall leave home. I thought once that I would rather be taught all my days than teach. Now, however, I feel that it must be interesting to teach children and find out their ideas and interests and all the workings of their minds."

In this case there was a conscious struggle. Other cases could be given where the children seem to develop as the flowers and the trees and the birds, and take their place in the world with as little fear or hesitation. Some even look into the future with joyous expectation and a firm resolve to meet their troubles as St. George met the dragon. While it is true that the majority of the papers do not indicate any striking difficulties of internal mental adjustment in the choice of a career there are exceptional cases of much interest, and before leaving this topic one paper will be quoted in full.

It is by a girl of " sixteen summers " who took as her nom-de-plume " Dabblah-loving-all-things-doing-no-thing." She is one of those who prefer to " linger with reluctant feet, where the bank and river meet," in that borderland between childhood and adulthood; to picture a world of dreams rather than to contemplate a practicable career.

" Where the ancient kings and princes
Lived in palaces and mansions,
Where the queens and bashful maidens
Sighed by balconies and turrets,
Where the knights in shining armour
Fought in tournaments with lances,
I would live and be a jester,
Be the fool of one " Prince Labour."
For to-day the modern people
Work if they are worth their wisdom ;
Nothing can be gained by dreaming.
He who means to find the true life,
Find the purpose of all living,
Must be strong and very plucky,
Must have will-power, nerve and courage.
And since I am very feeble
I would leave the modern people.
I would go and be a jester
To a king in ancient history.
From the books that I have studied,
From the people I have met with,
'Twas from these I gained my longing,
This desire to keep on smiling

When the world is very horrid ;
And to make another happy,
He a prince of mighty courage,
One who does things—not a dreamer.
And I think that this would teach me
What is meant by Courage—Courage,
All that makes life worth the living.
When this longing came I know not ;
But I know that all my lifetime
Must be spent in finding courage,
And if I might choose the pathway
I would wander down the ages
Till I found my " Prince of Labour."
Then when he was very weary
I would chase away his sorrow
'Twould mean trying to be funny.
(This in modern days is wicked,
Is a crime above all others),
But it would not matter—could not,
For I would succeed in trying.
Thus it seems to be a jester
Is the life that I would choose me,
Picking out the happy moments,
Scorning sorrow—treading on it,
And in treading on it mount up
To a happy land where courage
Lives in all his regal splendour."

The reasons given were :

" Because it is wholly impossible, but if it were possible :

(1) It requires skill rather than labour.
(2) The hours are easy—where sorrow is not, time cannot be counted.
(3) It offers great prospect of advance—in wisdom—which is, after all, the only thing worth while."

VI.—STRIKING RESULTS FROM THE PAPERS OF THE CHILDREN AGED 15 YEARS TO 15 YEARS 11 MONTHS.

In the course of investigation the following facts emerged.

Not one child of this age, boy or girl, expressed a desire to keep young. This is true of no other age.

There is not a single expression of fondness for school. This also is true of no other age.

The desire to continue education is mentioned less often than at any other age—it takes eighteenth place.

The direct influence of relatives or teachers, which takes first or second place with all other ages, now comes fifth.

Fondness for school subjects, though fourth, is lower than at any of the younger ages.

The two reasons, easy work and long holidays, are mentioned oftener now than at any other period. They take first and second places respectively.

These children do not seem to like the thought of hard work, and in this they provide a contrast to the younger children, many of whom revel in the thought of really hard work. Some simply say they like it hard: one says, "the harder the better," another, "the more irksome it is the better pleased I shall be."

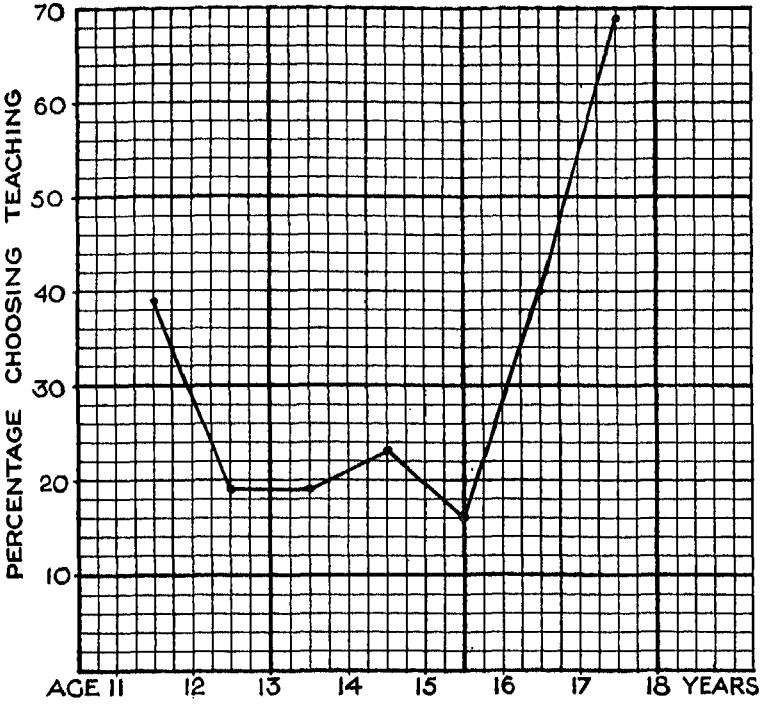
The children *over* sixteen, though they never extol the pleasures of hard work, seldom express disapproval of it. They do not often give short hours and easy work as reasons for their choice. They more often write in this strain: "The short hours appealed to me when I was younger, but I fear they are a delusion."

Another point of special interest is that a smaller percentage of children between fifteen and sixteen than of any other age chose teaching. There were altogether 190 children of this age, 119 boys and 72 girls. Of these only twelve boys and eighteen girls wished to become teachers. The percentages at different ages are shown in Table IV and also in graph form.

TABLE IV.

Age.	*Percentage of children of different ages who chose teaching.*
17 years and over	69 per cent, i.e., 44 cases out of 64
16 years to 16 : 11 months	40 ,, ,, 42 ,, ,, 106
15 ,, 15 : 11 ,,	16 ,, ,, 30 ,, ,, 191
14 ,, 14 : 11 ,,	23 ,, ,, 54 ,, ,, 230
13 ,, 13 : 11 ,,	19 ,, ,, 45 ,, ,, 234
12 ,, 12 : 11 ,,	19 ,, ,, 38 ,, ,, 201
11 ,, 11 : 11 ,,	39 ,, ,, 31 ,, ,, 79

All these facts taken together strongly suggest that for many secondary school children life round about the age of fifteen to sixteen is particularly trying, and that specially tactful and considerate treatment



is desirable. In these days of belief in free development it is a question of educational importance whether the pressure of compulsory and routine work should not be relaxed as far as possible about this time, and more freedom given for the children to follow their own inclinations, whether to do things or to dream of the things they mean to do.

VII.—THE FACTOR OF EXPEDIENCY IN CHOOSING A VOCATION.

From Table III it will be seen that thirteen per cent give as a reason the fact that there is nothing better to do. Some must teach something, others hate the alternatives or want to avoid worse, by which they generally mean office or factory work. This kind of reason is given oftener by the older children than by the younger. It is most common of all with the group aged seventeen and over. With them it gains fourth place for frequency. A further nine per cent express a preference for some other occupation which they are unable to take up; they want to become, for example, a doctor, a nurse, a missionary, an actress,

a musician, a civil servant, a private detective, a journalist, an engineer. A few (three per cent) say that they or their parents think they are "good for nothing else." Several kinds of incapacity, imagined or real, which bar the way to other occupations, are considered no bar to teaching. Physical troubles such as bad eyesight, or being subject to headaches, are mentioned. So are intellectual difficulties like not being clever. One boy, with a touching faith in the educative process, writes: "My abilities are not as excellent as they might be, but I consider that by the time I have finished my school career I shall be intelligent enough for the above-mentioned job." Temperamental defects, too, are sometimes given as reasons. A girl of sixteen writes: "For a long time I could not decide what I should take up—the greatest reason why I have decided to take up teaching is because I could not do anything else. If anything more exciting came my way I should jump at it. I am one of those persons who cannot stick at anything for very long without despairing, so my parents think it would be a good thing if I was settled, and I should have to stick at it if I began teaching." Yet the profession is not swamped with effetes and incompetents. It needs no defence, for the vast majority are capable and devoted workers. In the first place many who choose it have the essential qualities in a marked degree. Secondly, the elimination, in the early preparatory stages, of those who do not show at least a minimum of what are considered the most necessary qualities is a definite factor in the maintenance of a high standard. Of those who survive the test, the positions of greatest influence are naturally not attained by those poorly endowed with the necessary qualities, nor is it from these that the profession takes its tone. It is rather from keen and thoughtful enthusiasts with the requisite gifts of intellect, will, and feeling, whose spirit is infectious and under whose influence even weaklings are moved at times to do valuable work.

In spite of the high standard, however, there is always a proportion who have chosen the wrong vocation, and undoubtedly many of these ought to have had more and better advice and guidance at the time of choice. Once the decision has been made elimination is difficult, and apt to be painful to all concerned. Those who reach the first or second stage of preparation only to find they must seek a new path have lost valuable time, and, what is more serious, run the risk of becoming disappointed with life, discouraged from effort, embittered.

VIII.—The desirability of more definite guidance.

Economic factors and the opportunities available must play a large part in the choice of occupation. This increases the necessity

that the choice should be made with open eyes, that the children should know early that the best or only choice possible in the circumstances has been made.

The ideal, though impracticable at present, is worth considering. Ideally a great deal more must be known about vocations, and a great deal more about children. We need to know what vocations are open, their occurrence, frequency, conditions of work, changes occurring from time to time; also the qualities essential or desirable in each vocation. In reference to the child we need to know his particular qualities; qualities of intellect, will, and temperament, including his vocational leanings and his more purely physical qualities ranging from characteristics of general health to particulars of, say, manual dexterity.

Each individual has some relatively strong point or points in his make-up. Professor Spearman, in considering the abilities of man,* finds evidence that the great bulk of any one normal person's abilities tend to be mediocre, that is, near the general average for the class of individuals under consideration. A fair number of his abilities are distinctly above and a fair number distinctly below this average. At the extremes he is, on one side, a genius for a very small number of abilities, and on the other side an idiot, also for a very small number of abilities.

Mental and physical tests have not reached that degree of perfection that would pick out the genius in each one of us. Also, considerable time must elapse before temperamental and moral characteristics can be measured or their effects estimated. But the adult can discover much about the capacities of the children under his control, and much about vocations. This done, more help can be given in a choice of career. If a child can face the world knowing that he possesses, and can use in his work, something the world values, this knowledge can help him not only to do well those things at which he excels, but also to attempt those things at which he is not so good. Success begets success, and the assurance of success, founded on the consciousness of previous successes, is of social as well as of individual value, for it tends to a friendly relation with other people. Lack of self-confidence, on the other hand, tends to lead to jealousy and distrust of others.

Exact information about careers ought to be easily available to parents, teachers, and children. A little progress is being made. Certain educational authorities have done something. The Incorporated Associations of Head Masters and Head Mistresses of Public Schools

* *Abilities of Man*, page 220.

and the Ministry of Labour are at present issuing a Choice of Career series of pamphlets. The National Institute of Industrial Psychology tests individuals, and is carrying out experiments in vocational guidance. Some interesting results have already been obtained.*

In spite of these and other important efforts, for various reasons large numbers of parents and teachers do not study and pass on to the children exact information even when it is available. The children themselves are all too unlikely to seek exact information in the glow of enthusiasm for a profession which has touched their imagination or which seems to provide an outlet for some adolescent urge. Occasionally they do ask, and the information is not forthcoming. Furthermore, many teachers, having perhaps the right qualities themselves, think there is no work like teaching and are tempted to encourage " clever " children, those who are " good at books," or at special subjects, to take up teaching, irrespective of other considerations. Special ability in one or more subjects is of course indispensable, but it is not by any means the only necessary qualification. Some would say it ought not to be the first. Yet there is no doubt that children are often advised on this ground alone.

Throughout the papers there is little to suggest that a reasonable attempt was generally made to discover what vocations were possible for a given child, and for which vocation or vocations he or she was by nature best fitted.

IX.—Summary of results and conclusions.

(1) Out of a total of 1,105 secondary school children 284 gave as their choice of vocation the teaching profession. It was the most popular of all professions and was more popular with the girls than with the boys.

(2) Only a minority of the papers, even amongst the oldest pupils, gave sound reasons or indicated that the choice had been made after reasoned consideration.

(3) The direct influence of relatives or teachers is the reason most often given. There is evidence that this influence is not always wisely exercised, that undue pressure or interference is strongly resented, and that friendly advice and encouragement are highly appreciated.

(4) There are many illustrations of the tendency, found in adolescence, to cling to former phases of development, i.e., not to grow up.

* See *Journal of National Institute of Industrial Psychology*. Vol. V. No. 5 and earlier numbers.

(5) The papers of the children between fifteen and sixteen years of age are exceptional in several respects which suggest that life is just then found to be exceptionally trying. This may mean that special treatment is desirable.

(6) Throughout the papers there is strong evidence of a dearth of exact knowledge about careers, and no evidence of any general realization that in choosing a vocation some effort should be made to ensure that the choice made is one which provides a reasonable prospect of success and happiness.

X.—SAMPLES OF CHILDREN'S ANSWERS TO ILLUSTRATE THE STANDARD TAKEN IN MARKING.

(1) *Good or Satisfactory.*

"*Mary Jones,*" *age* 16 ; *teaching.*—" I made this decision practically the first time I was given a doll. I sat her before me and 'made her behave.' From that time I collected dolls until I had about twenty, and day after day without tiring of it I played school. I had a blackboard and easel and picture books, and then one great day I went to school myself. Here the desire to teach grew stronger. I thought how delightful it must be for the teacher to possess all those coloured books and crayons and how she must enjoy herself, never realizing that a teacher's work is not play. As I grew older I began to realize that a teacher meant very much more than this and most of my leisure time was spent in thinking of my ideals and what I was really working for. Why were there teachers ? What were their main objects in life ? Why be a teacher ? Why go to school at all ? And at last the necessity of education dawned upon my horizon. From this time forth I decided that in no way could I serve my country and fellowmen in any better way than by spreading education. Since then I have made several psychological experiments which only help to increase my desire.

" I was influenced but little ; my mother and father left these things entirely to my own decision, only pointing out the hardships as well as the pleasure. My school friends laughed at me, but they did not influence me in the slightest. The work is hard, and when all the examinations are passed and a post secured the work perhaps is harder still, but the aims are good and there is the satisfaction that you have achieved something."

(2) *Only Fairly Satisfactory.*

"*Skylark,*" *age* 17 *years* 2 *months.*—" I have decided to be a teacher, but I do not yet know exactly what kind. I made my decision when

I was sixteen, but I have not yet determined whether I shall take a degree and teach in a secondary school or whether I shall teach in an elementary school. For a long time I could not decide what to do when I left school, and when I struck out all the professions which I did not want to follow teaching was the only one left, and this is partly why I made this choice. Another reason is that I am very fond of little children. Many of my friends have started to teach and their enthusiasm for it has made me quite eager. And so I have decided to teach."

(3) *Unsatisfactory.*

"*Ellen Buxton,*" *age* 17.—"I have decided to become a teacher. I think I finally decided when I was sixteen, but I have hardly ever thought of being anything else. I have decided since I have been seventeen to be an elementary school teacher.

"I do not know exactly why I have made this choice. I think chiefly because I have always thought of myself as going to be a teacher, and when I came to decide finally I could not change. I do not want to take up any other profession or occupation, so I had no reason to want to change. Happily I am getting to like the idea of teaching more and more since I have finally decided.

"I think my family has influenced me most; my teachers at both elementary and secondary school have influenced me, too; but I cannot clearly define which special people. It is chiefly general impression, the idea that has grown with me that I shall be a teacher, and I feel that it would be wrong for me not to follow what has become nature. I feel that I could not change and I am right because I feel happier since I have decided."

RÉSUMÉ.

LE CHOIX D'UNE PROFESSION: L'ENSEIGNEMENT.

On analyse les feuilles de 284 élèves des écoles secondaires, qui ont choisi l'enseignement comme profession future. Les raisons les plus généralement avancées et leur fréquence exprimée en pourcentage sont indiquées. L'influence des adultes se montre la plus forte reason isolée, et les élèves dans les classes supérieures révèlent la force de l'influence du professeur. L'idée de pouvoir futur donne à quelquesuns un certain plaisir. Le fait d'avoir des parents dans l'enseignement est un attrait accompagné de certains dangers, pour d'autres; les feuilles des élèves entre 15 et 16 ans donnent des résultats anomaux. La tendance à s'attacher aux phases passées se démontre, et semble influencer le choix de certains élèves. Beaucoup de jeunes filles de 17 ans choisissent l'enseignement parce qui il n'y a rien de meilleur à

faire, ou parce qu'elles ne montrent pas d'aptitude pour autre chose. Et pourtant le niveau professionel est élevé dans l'enseignement. On en suggère des raisons et on prouve qu'il est nécessaire de fournir aux enfants des renseignements plus précis au sujet des carrières parmi lesquelles ils doivent faire leur choix.

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ÜBERSICHT.

WAHL EINES BERUFS: DER LEHRBERUF.

Die Antworten von zweihundert vierundachtzig Schülern aus höhern Schulen, die den Lehrberuf wählten, werden analysiert. Man gibt die häufigsten Gründe für die Wahl und ihr prozentuales Vorkommen. Der Einfluss Erwachsener zeigt sich als der allerstärkste, einzelne Grund, und die älteren Kinder weisen darauf hin, dass der Einfluss der Lehrer eine überaus grosse Rolle spielt. Der Gedanke an eine künftige Autorität bereitet einigen Freude. Die Tatsache, dass sie Verwandte im Lehrerstand besitzen, ist eine Anregung, die von Gefahren begleitet ist. Die Antworten der Kinder zwischen fünfzehn und sechzehn Jahren geben unregelmässige Resultate. Die konservative Tendenz, vorhergehende Phasen der Entwicklung beizubehalten wird gezeigt, und scheint, einige Kinder in ihrer Wahl zu beeimflüssen. Viele der siebzehnjährigen Mädchen wählen den Lehrberuf, weil es nichts Bessres zu tun gibt, oder weil sie scheinen, zu nichts Anderem zu taugen. Und doch ist der Grad der Leistung im Lehrerstand hoch. Man schlägt Gründe vor. Darauf wird hingewiesen, dass den Kindern mehr Auskunft über die Laufbahnen zu Gebote stehen sollte, aus denen sie wählen sollen.

EDITORIAL.

FOR the sake of old readers of the *Forum of Education*, who overlooked the Editorial in the last number of the *Forum*, and for the sake of new readers, it may be well to say something of the origin and aim of this JOURNAL.

The *Forum of Education* dealt not only with the psychology of education, but with philosophical, historical, and administrative aspects of education. It had extended its circulation to most of the civilized countries of the world, and its decease, or rather change, is by no means due to internal causes. It was, however, felt by many, and especially by members of the Education Section of the British Psychological Society, that it was desirable to have a journal entirely devoted to Educational Psychology. The British Psychological Society then approached the Training College Association with a proposal for such a journal, and it was decided that the *Forum* should undergo a metamorphosis and that a journal incorporating it should appear under the present title.

This JOURNAL will be a sister journal to the well-known *British Journal of Psychology* and the *British Journal of Medical Psychology*, both issued by the British Psychological Society.

We may call attention to the international aspect of the new JOURNAL. The names of some of the most distinguished authorities in other countries on educational and child psychology will be seen on our Editorial Board, and it is proposed to include with every article résumés in French and German to facilitate the study of the JOURNAL abroad.

The JOURNAL will be devoted to educational psychology, but that term will be broadly interpreted, as nearly all problems of education have a psychological aspect; so that papers dealing with researches on almost every aspect of education may be included, and, in particular, papers dealing with method from a psychological point of view, with the psychology of childhood, with all problems of organization which have a psychological aspect, and including statistical enquiries on all such topics.

Reviews of all important books on psychology, and especially those which have any bearing on education, will continue to be a prominent item of the JOURNAL in its new form.

The JOURNAL will welcome accounts of the work of experimental schools and of the trial of new methods, provided they are critical and psychological.

We would repeat here what we emphasized in the first number of the *Forum*. If the study of education is to be lifted above the level of a mere interchange of opinions, if it is to approximate to a science, it must insist that where actual facts can be obtained instead of suppositions, where an experiment can supply evidence on a problem, in all such cases experiments and statistics must be used. We say this fully aware of the fact that statistics in such complex studies as education and psychology are usually hard to gather and harder to analyse and interpret, and that experiments in the field of psychology and education are full of the possibilities of pitfalls. Some researches prove of little value because of a fatal ambiguity or flaw in method. In a sense we are still occupied to some extent with devising and refining our methods and machinery for investigation. And yet the amount of definite, well-substantiated material gained by psychological, experimental, and statistical enquiry, is already very considerable, and throws light upon practically every problem of education.

It is hoped that the new JOURNAL will not only give accounts of such enquiries but will itself be a centre for their co-ordination. From time to time suggestions will be made for enquiry, questionnaires printed, and requests made for reports from teachers and others competent to give definite evidence.

Finally, we would emphasize the fact that we are concerned with practical method. That is and will be for most the ultimate end and justification of scientific enquiry and psychological analysis; but it is only when a method or a scheme of work has been critically considered, and its fundamental bases made clear, that it can be fairly judged or properly adopted by other teachers under different conditions. The mere imitation of externals without a grasp of fundamentals may be very far from the original. Here the interests of the investigator or the psychologist and of the practical teacher meet, and one of our main objects will be to provide a meeting place for their common interests.

INTELLECTUAL GROWTH IN YOUNG CHILDREN.

By SUSAN ISAACS. (Routledge and Sons, Ltd. Pp. 370. 12s. 6d.)

THIS book is beyond doubt one of the most important recent contributions made to the psychology of childhood. It is based chiefly upon observations made of young children in the Malting House School, Cambridge, during the years 1924-7, and is one of three books which Mrs. Isaacs proposes to base upon these studies; the second is to deal with the social life of the child, the third comprising case-histories. Mrs. Isaacs clearly states that this separation of the two studies is only made for the sake of convenience of treatment, and she emphasizes the importance of the interplay of social life upon intellectual development. The book includes chapters giving actual records of conversations between the children, and between the children and members of the staff, and from these chapters others working upon the psychology of the child can gain a large amount of useful material. In addition, in other chapters Mrs. Isaacs analyses the material in a penetrating and lucid manner from the psychological point of view. In her introduction she emphasizes, very rightly as it seems to me, the importance of studying the development of the thought processes of a child in close association with its activities. My own impression is, indeed, that children, when actively interested, can rise to a level of mental activity which they cannot reach under some formal tests when they are not so completely interested. In the Malting House School the children were allowed a far greater degree of freedom than is usual either at school or at home. Consequently Mrs. Isaacs claims they were more natural, more spontaneous, and their own innate tendencies towards certain types of interests and activities came out in a way that is not usual.

As Mrs. Isaacs points out, we can never entirely rule out adults as a factor. Nor does it seem important to do so. After all, adults—parents, teachers, and others—are part of the normal environment of the child, and it is how he reacts in different types of environment that we chiefly want to know, not how he would behave in a world only of infants, or even on an island alone, interesting as such knowledge would be, if it were possible.

As to freedom of action, that is by no means complete when a child is left merely with other children; and the Malting House teachers had

to interfere, as examples show, with the tyranny and oppression of some of the children towards others.

The conditions of observation at the Malting House School, described in Chapter 2, were, however, about as well adapted as possible to encourage freedom of action and utterance among the children; and the author's expression of her fundamental educational principles seem to me admirable. Undoubtedly we miss much by neglecting to provide for the satisfaction of the child's curiosity about himself and the everyday things of the external world during the years from 2-3 to 5-6; limitations due to confinement in the ordinary school makes this impossible, and even the most willing of parents have not the time to do the kind of thing that the devoted Karl Witte, for example, did for his son.

Passing to the more strictly psychological part of the work, we find this divided into convenient sections, the first being a theoretical analysis of "Discovery, Reasoning and Thought," followed by records of observations on the children bearing on these topics.

In this section Mrs. Isaacs discusses characteristic views of Piaget; while paying a tribute to the value of his studies, she criticises him for treating development too much as divided into marked stages, and too much as a process of mere maturation. With her criticism of the late age at which Piaget puts the appearance in the child of the apprehension of relations, I am in full agreement. Indeed I should go further than Mrs. Isaacs and put the appearance of the grasp of all the fundamental relations (as given, for example, by Spearman) at the age of two or three in some children. I do not feel, however, that Piaget is open, to the same extent, to the accusation of making too much depend on maturation. Indeed it seems to me that a corollary of some of his characteristic views (as that the egocentricity of thought remains because it is not brought into comparison with the thought of others) is that the deliberate provision of such inter-relation, by criticism and suggestion, may greatly stimulate the development of rational thought: in other words, that social influences are, or at least should be, for Piaget the important factor in thought development.

Another matter in which Mrs. Isaacs differs from Piaget is that of "Monologues" among the children. In the conversation of the children at the Malting House School relatively little was found in the way of monologue; Mrs. Isaacs stresses the fact that usually, even with the children of four to six or seven, talk is already social, and the "collective monologue" (as Piaget calls it) she never noted. My own impression is that with some children the tendency to monologue is actually much stronger when quite alone, and otherwise unoccupied.

The next point that Mrs. Isaacs stresses is the fact that true reasoning begins earlier than Piaget asserts, and that it begins only gradually; that the child, as the adult, often falls below a level of intellectual dexterity of which he is at times capable. Piaget's tests for reasoning, indeed, the author thinks, are sometimes interfered with by the rushing in of fantasies, which may be confused with beliefs by the adult observing the child, though not by the child himself.

With Mrs. Isaacs' placing of the beginnings of reasoning earlier in the life of the child than Piaget allows, I am in full agreement; indeed, I am again tempted to give in support of her argument examples at even earlier stages of the first sporadic occurrences of such reasoning process; but one must not turn a critical notice into an article.

The third main section of the book deals with biological interests. In the discussion of results Mrs. Isaacs soundly argues that the handling of animals and the dissection of dead ones, so far from encouraging cruelty, checks it. "The impulse to master and destroy was taken up into the aim of understanding." I think all who have had much to do with very young children will agree with her findings that an animal, living or dead, makes a stronger appeal to the interest of most children than does a plant, apart, perhaps, from the strong æsthetic appeal of beautiful flowers to some children. Forty-three pages are devoted to records of evidence of the children's interests in and attitudes towards animals (chiefly) and the human body. For the sake of the ordinary student, these, I think, might have been cut down somewhat, to make way for fuller discussion which would have been welcome; but I say this with some hesitation, as these pages provide much useful raw material for the investigator.

The life of the children can be approached in a different way in the next chapter, which gives a constructive account of "Four Sample Weeks"; while the succeeding chapter will be of special interest to the practical teacher, as it gives a detailed "Summary of activities in the School."

I have still to write of the important contributions made by Mr. Nathan Isaacs in the appendices, especially his substantial section on "Children's 'Why' Questions." This is a searching analysis of the various types of "Why" questions. Mr. Isaacs finds that one essential function of the "Why" questions is "epistemic"; they arise from puzzlement in the growth and organization of knowledge. He repeatedly points out that there are other types of "Why" questions, but a passage on page 302 suggests that other types of "Why" questions are "all originally

related in some ways to situations of unexpectedness," though a whole group of "Why" questions become differentiated from this origin.

As Mr. Isaacs points out (page 305), the appearance of "epistemic questions" in the child is the more remarkable in that "whys" addressed to him by parents and nurses would never be truly of this type proper, but "motivational" or otherwise psychological. The child might, however, hear questions of the "epistemic" type made by other children to adults, or to one another; but I agree that this would not be enough to account for the facts if there were not, as Mr. Isaacs asserts, within the child "a powerful intrinsic drive of attention and interest in the right direction."

My own observations on the very first beginnings of the use of "Why" (by infants of 2; 7 to 3) suggest clearly that the first uses of "why" are in asking motives, and that the first understanding of "Why" (in the preceding six months) was in answer to questions as to motives put by the parents; also there is evidence of the close association of the first "Whys" with the use of "What that for?" actually passing into "What you do that for, why?" At this early stage I am sceptical as to the presence of any epistemic element in the sense of any felt need to co-ordinate ideas. Yet even if the epistemic is not the original type of the "Why" question, I believe that some of the "Why" questions soon after the very earliest, and at least as early as those Mr. Isaacs examines, are capable of the interpretation he puts upon them. All he claims, as he says later (page 332), is that "children do tend at a quite early age, often between four and five, sometimes earlier, to develop some degree of concern about the truth, sufficiency, or clearness of their knowledge, because they frequently stumble into situations which force just this concern upon them." And here again will be seen a main divergence from Piaget; and Mr. Isaacs defends his own view with remarkable acuteness.

In conclusion, I wish space permitted me to give some quotations from the sayings of the children at the school: some of them will make readers look with interest for the individual case histories, which are to follow. Altogether Mrs. Isaacs' work should provide a great stimulus to the study of the psychology of early childhood; and that is important, not only for the sake of the understanding of little children, but for the understanding of later stages of childhood and of the psychology of adult life itself. Towards this the present volume is a most notable contribution.

BOOK REVIEWS.

Creative Mind: By PROFESSOR C. SPEARMAN. (London: Nisbet and Co., Ltd., Cambridge University Press. Pp. x+150. Price 5s.)

The aim of this book is to give, in a popular way, without loss of scientific accuracy, a solution to the problem of how the mind achieves its creativeness.

"Creative Mind" is mainly concerned in showing how the fundamental principles of cognition (qualitative and quantitative, noegenetic and anoegenetic) apply to the creation (including the appreciation) of pictorial and other fine arts, scientific invention and discovery, behaviour, dreams, and hallucinations. To this extent only might it appear in the nature of a commentary or appendix to the author's great works previously published, in particular to *The Nature of Intelligence and the Principles of Cognition*. But this is a superficial view. The book is self-contained, close packed with information, the result of many years of scientific research, and so truly a masterpiece of lucidity and conciseness that it is one witness more to the intellectual greatness of its author, and a delight to the reader, perhaps even to one with but slight acquaintance with psychology and art.

Since the book is principally concerned with a discussion of the applications of the fundamental principles, it seems a graceless, if not an irrelevant task, to question the latter. Professor Spearman, however, encourages us to such questioning in that he raises some of the problems himself. He claims for them "completeness" and the function of "supplementing each other in the order of mental development."

He points out that the "immediate knowing of relations" (second principle) cannot precede the "immediate knowing" of the characters (first principle).

May it not be that these two are contemporaneous and reducible to a single mental process; that what is logically distinguishable is psychologically one.

In his chapter on "Behaviour," Professor Spearman analyses two interesting experiments with a view to showing that the failure of the subjects in solving simple problems is in the main a difficulty in applying to a new context a relation discovered in the old (third principle). In accordance with his excellent habit of suggesting fruitful themes for experiment, Professor Spearman says in this connection, that "investigation is urgently needed into the conditions upon which this difficulty depends." Since he announces in a previously published work that the power to educe correlates closely connects with "g" the problem apparently is to discover the conditions under which general intelligence works. If this is so, are we after all on the bedrock of fundamental principle? One wonders whether, in fact, one has been led so far away from the principles of "formal similarity" and of analysis and synthesis on which for explanation of intelligence psychologists of the older school relied.

In writing this the reviewer feels somewhat in the position of the sparrow criticising the eagle! Particularly so since Professor Spearman claims (and no psychologist is more careful than he to have adequate grounds for his conclusions) that, since publishing his earlier works, "not a single further law or process" (beyond those stated in his opening chapters) would seem to have been so much as seriously proposed.

The beautiful way in which the cognitive principles apply to the mental creations classed under arts and scientific discoveries should do more than argument to convert a sceptical reader to the view that the cognitive principles are fundamental and exhaustive.

The chapter on pictorial art directly helps him not only to a fuller comprehension of the working of the cognitive principles in relation to art, but also to appreciate more intelligently works of art and more intelligently to create them. The other fine arts are treated somewhat more summarily, though with equal insight and sufficiently in detail to indicate that the analysis that applies to pictorial

art applies equally to the others. At the same time let it be noted that not every artist will agree with Professor Spearman's analysis of the artist's aims.

The art of teaching and the art of moral conduct are not referred to; the application of the principles to each of these may be left as an interesting and inspiring exercise for the reader.

A word must be said about the chapter entitled "Unreality." Professor Spearman holds that dreams, delusions, hallucinations, obey the noegenetic principles equally with reality, and his argument seems conclusive.

In an early chapter the author discusses the nature of creativeness, pointing out that the three noegenetic principles are respectively in the first, second, and third degrees creative. In the final chapter he leads us to metaphysical speculation. He suggests that "the whole universe, as everyone of us ordinarily perceives it, is but one more—and surely the greatest—of our mental creations."

M. HAMMOND.

Education: Its Data and First Principles: By SIR PERCY NUNN, M.A., D.Sc., Litt.D., LL.D. (London: Edward Arnold and Co. Pp. 260+ix. 6s. net.)

Sir Percy Nunn's book has established itself long ago as one of the most authoritative works on the fundamental principles of education. It is exceedingly gratifying to find that he has made time to give a thorough revision to the book and to extend it by incorporating more recent findings, particularly in psychology; such, for example, as some of the newer developments in Behaviourism, and in the study of the Unconscious.

The treatment of some of these more recent topics is necessarily brief, but it is most valuable for students to have even a brief treatment by such a distinguished authority, and Sir Percy has a marvellous gift for picking out of a school of thought the main ideas that are of value, and particularly of value for his main purpose, and also for seeing the characteristic weaknesses of some of these newer schools of thought.

The author has also taken advantage of the comments of students to clarify the argument in some parts of the book which the ordinary student found obscure and difficult.

The final result is a book which is, even more than the first edition, a triumph not only of original presentation, but of comprehensive treatment of almost every aspect of education within a relatively small compass. C.W.V.

Psychologies of 1930: Edited by CARL MURCHISON. (Clark University Press. Worcester, Massachusetts. Pp. 497. 27s.)

Professor Murchison is to be congratulated on gathering together again such an excellent team of leading psychologists to state something about the fundamental ideas of their own psychologies or some characteristic view of the school which they represent. There are so many varied aspects of psychology dealt with in this volume that it would be impossible to give a full review without occupying many pages. One can only rejoice to find the view stated by Professor Murchison that it is essential for the theoretical foundations of experimental work to be examined searchingly from time to time. Even to mention all the various contributors would take too long, but one welcomes articles by the English psychologists—Spearman, "On 'G' and After—A School to end Schools," and Flügel, who treats of the status and promise of psycho-analysis. Perhaps it is invidious to pick out special writers among the others, though one welcomes again an opportunity of getting, in English, articles by Russian psychologists, including one by Pavlov on "A Brief Outline of the Higher Nervous Activity," and also a treatment by Köhler on the Gestalt Psychology. It is good also to see Dewey again entering the psychological arena and to have chapters by such distinguished men as William McDougall, Pierre Janet, and Alfred Adler. Altogether, this volume, together with the earlier one, *Psychologies of* 1925, covers an enormous field of psychology as treated by many of its leading exponents.

The Measurement of Manual Dexterities: By F. M. EARLE and F. GAW, and other Members of the Institute's Staff. Report 4 of the National Institute of Industrial Psychology. (Pp. 88. 5s. net.)

The members of the staff of the National Institute of Industrial Psychology have greatly extended their work on "Manual Dexterities."

More than 1,000 children between the ages of 12 and 17 have now been tested. The majority were elementary school children approximately 14 years of age, most of whom were likely to enter manual occupations. It was therefore important to get some measure of their aptitude for work in which manual dexterities are required.

It is realized that success in manual occupations is dependent on a number of factors other than manual dexterities, but also it is clear that some of these tests of dexterity give a sufficiently high correlation with proficiency in manual trades to warrant the use of the tests as part of a procedure for selecting the best trainees for the occupation in question, though much further work must be done before the means of measuring manual dexterities reach the desired perfection.

The tests are described, and their validity and reliability receive consideration.

Certain sex differences are found, and, as the investigators rightly point out, these differences may be innate and characteristic of the sexes, or they may be produced by special training superimposed upon special bodily endowment. Boys seem likely to do better than girls in tests in which strength and speed of movement are required. Girls seem likely to excel in tests in which independent control of all four fingers is required.

Training *seems* to produce special excellence in some of the tests, especially in speed tests and tactual discrimination tests. As in the case of sex-differences it is impossible to say whether this is due to greater aptitude or to training.

Conclusions already reached are fully confirmed. It is found that the abilities involved in the various tests for "manual dexterity" are largely specific to each. Though no *general* factor of "manual dexterity" is discoverable, the existence of *group* factors—common to, and influencing success in, *certain* tests is by no means wholly excluded. It is suggested that these group factors might be speed and accuracy. It is also suggested that these group factors may account for the finding that training for certain trades may lead to increased proficiency in certain tests.

F.M.A.

The Psychology of Clothes: J. C. FLÜGEL, B.A., D.Sc. (Hogarth Press. 21s. net. Pp. 257.)

Professor Flügel is already known as an authority on the psychology of clothes from his very popular talks on the subject under the auspices of the B.B.C.

In this volume he has given a most elaborate and comprehensive discussion of the whole subject. The book is extremely well produced with a large number of most admirably selected illustrations. As one would expect, Professor Flügel stresses throughout the interpretation of many phenomena in accordance with the psychology of the unconscious, of which he is so well known an exponent; but even those who are unable to go as far as he does in this respect cannot fail to find a great deal that is suggestive and extremely interesting in the author's discussion. Undoubtedly the book will take its place as the leading exposition of the subject in English.

The Process of Learning: By CONSTANCE BLOOR. Pp. 284+vii. (Kegan Paul. 7s. 6d. net.)

This book is written with a view to meeting the needs of students in Training Colleges. The author's design is to help to foster a scientific attitude and to provide a simple background of approach to more authoritative text books rather than to make a complete statement of the bearing of educational theory upon educational practice. After an *Introductory Chapter*, and a Chapter on *Education and Psychology*, the remaining sixteen chapters are divided into two parts. The first part deals with *The Learning Process*, and the second with *Character and Discipline*.

The material is up to date, and a vast amount of theory has been successfully bound together with an eye towards the problems of the school class-room. Although all students ought to find much help here, one might venture to predict that the book will be most successful with the better students.

There is a very useful appendix on *The Instinct Controversy*. In this a very brief outline with comparisons of different theories is given. Adequate references are provided at the end of each chapter.

The Psychology of the Infant: By SIEGFRIED BERNFELD, translated by ROSETTA HARWITZ. (Kegan Paul. Pp. 309+xi. 15s. net.)

Dr. Bernfeld in this book makes a study of the first six or nine months of the child's life from the Freudian point of view.

It seems, however, that the author can only make use of reports of observations made by other people, and we are inclined to think that his treatment of the subject would be considerably changed if he had had the opportunity of direct observation of a number of children during the whole period discussed, and also at a later period.

The book deals with such topics as sleeping, crying, reflexes, and the beginnings of perception and instructive life, the instinct of mastery receiving special treatment.

On many points Dr. Bernfeld is undoubtedly very suggestive, even if his main thesis seems somewhat unconvincing.

A Changing Psychology in Social Case Work: By VIRGINIA P. ROBINSON. (The University of North Carolina Press, 1930, or, in English, The Oxford University Press. Pp. 204+xvi. 11s. 6d.)

This extremely interesting book, by the Associate Director of the Pennsylvania School of Social and Health Work, is divided into two main sections with the year 1920 as approximately the dividing line. Before that date social case work was largely dominated by "The Emergence of the Individual"; since that date by "The Emergence of Relationship." The writer consistently develops this view, and has written a book which will appeal to many parents, teachers, and social workers.

Psychology of the Common Branches: By W. H. PYLE. (Baltimore, Warwick and York, 1930. Pp. 381+vi.)

Professor Pyle, a well-known author of several books on Educational Psychology, here discusses the principles of teaching the elementary skill subjects (reading, spelling, handwriting, and arithmetic). The writer critically examines most of the evidence available, shows clearly the principles which emerge, and, what is equally important, leaves the student in no doubt whatever that in many cases the evidence is such as to prevent the emergence of any really scientific principle of teaching.

Each chapter is followed by a useful set of exercises and a long list of references. One misses from the latter some important English researches.

The book will be a welcome addition to the libraries of many teachers and colleges.

Le Development Mental et L'Intelligence: Par HENRI PIÉRON. (Librairie Felix Alcan, Paris. Pp. 95. 10 Fr.)

This little book consists of four lectures given at the University of Barcelona. They deal with the stages of mental development, the measuring of levels of development, the relation between intelligence and other aspects of development, and finally with some problems of the evaluation of intelligence. The lectures are admirable in form and method. They give an analysis of fundamental ideas in a most lucid and helpful way. The whole treatment is well balanced, cautious, and suggestive. The book would be an admirable one to put into the hands of students, who have already some general knowledge of the topics dealt with, in order to consolidate their ideas.

The Teacher's Many Parts: By SIR JOHN ADAMS, B.Sc., M.A., LL.D. (University of London Press. Pp. 362. 6s. net.)

In this volume Sir John Adams has realized his long cherished ambition to produce a book untrammelled by the *impedimenta* of footnotes! This freedom perhaps explains the rather wide range of subject-matter that appears therein. In twenty chapters he reviews the teacher as a human being, as a social unit, as a psychologist, as a maker of men, as a writer of testimonials, as a parent, and as a citizen; as an artist, actor, disciplinarian, humorist, inspirer, and examiner; as a reader, writer, speaker, scholar, traveller, and as a man of leisure. The aim is to entertain rather than to instruct, but the author, as he confesses in his introduction, has found it difficult "to slough off completely the academic skin." He has succeeded in cutting out the footnotes but not in eliminating the Index. One of the most interesting chapters deals with the teacher as psychologist. It is worthy of note that a teacher of such wide experience is disposed to support the claim of psychological studies to be a necessary part of the teacher's training, although his cautious interpretation of their value for the active practitioner suggests Seneca's advocacy of liberal studies—our duty is not so much to study them as to have studied them. The book is a witness to the author's realization of his own dictum: "while there are very few psychologists in the technical sense of the term there are a vast number of people interested in the subject-matter of psychology." Sir John Adams is a past master in the art of nourishing this semi-scientific interest. His humour is so illuminating and so opportune that the reader will perhaps be inclined to forgive the theatrical critic of Sir John's lectures to soldiers during the war for making the suggestion that the lecturer aimed at raising a score of well-distributed laughs in the course of the hour. W.J.M'C.

Studies in Service and Self-Control: By HARTSHORNE AND MAY. (Pp. 559.)

Studies in the Organization of Character: By HARTSHORNE AND MAY. (Pp. 503.)

(Published by Macmillan. 12s. each volume.)

These two books conclude the report of the Character Education Inquiry undertaken by Teachers' College, Columbia University, in co-operation with the Institute of Social and Religious Research.

A large number of tests devised to measure various traits of character are described and used. The results show that character traits are groups of specific habits rather than general traits, and that a large battery of tests is necessary in order to measure a single type of conduct or a single trait of character, and are evidence that the efficacy of some common methods of attempting to develop desirable traits of character is doubtful.

The main topics of the inquiry are: Deceitful and Honest Behaviour (reported in a previous volume), Co-operative and Charitable Behaviour, Self-control, the Integration of Character, and the Organization of Behaviour.

The report is a valuable contribution to the scientific study of character and is worth the serious consideration of social and religious workers as well as that of those who are more specially interested in the technique of educational and psychological tests. It is noteworthy, not merely for the thoroughness and originality of the tests, but also on account of the significance of the results. A.E.C.

Five Types of Ethical Theory: By C. D. BROAD, Litt.D. (Kegan Paul. Pp. xxv+288. 16s.)

In this book Dr. Broad gives a critical exposition of the ethical ideas of Spinoza, Butler, Hume, Kant, and Sidgwick. The discussion is remarkably acute, as one would expect from Dr. Broad. The treatment of Sidgwick is particularly full, and the reviewer, as an old admirer and student of Sidgwick, is glad to find his own ideas about the pre-eminence of Sidgwick among modern ethicists confirmed by Dr. Broad's view.

An Introduction to the Social Sciences: By C. DELISLE BURNS. (Published by George Allen and Unwin, Ltd. Pp. 112. 3s. 6d. cloth, 2s. 6d. paper.)

This reprint of articles, originally published in the *British Journal of Philosophical Studies*, is designed to present a review of the field covered by the social sciences for those who are acquainted with the social problems which are commonly discussed by educated men and women who have neither time nor inclination for a detailed study of any one social science. The chapters deal with Political Organization, Economic Organization, Culture and Institutions, Order and Liberty, and Man and Society. Teachers of Social Studies and others can recommend this book with confidence to those who want a careful, balanced account of the whole field.

A.E.C.

The Growth of Ability: By R. O. FILTER and D. C. HELD. (Baltimore, Warwick and York, 1930. Pp. 174+vi.)

This little book is the most recent addition to the well-known *Educational Psychology Monographs* series. It well maintains the standard already set. "The aim of this little volume is to present the major problems of the psychology of learning without abstracting these problems from their natural setting." The authors work out the thesis that " ability involves learning " and accept as their guiding principle the " Conditioned Response " theory.

The Science of Living: By ALFRED ADLER. (George Allen and Unwin. Pp. 264. 8s. 6d.)

This book is a popular exposition of Adler's main psychological principles with special stress upon the application of these principles to the better understanding of oneself and better self-control and guidance. As an introduction to Adler's important work it will no doubt serve its purpose, but it is regrettable to find the worker, who has made so important a contribution to psychology as Adler has done, stressing to such an extent one or two main principles and applying them without a due sense of proportion. Sometimes not only a sense of proportion but a sense of humour seems to be lacking, as in the following statement: "A boy, asked what he wanted to be in later life, said ' I want to be a hangman.' " " This " (solemnly adds the author), " displays a lack of social interest."

Research Methods and Teachers' Problems: By D. WAPLES and R. W. TYLER. (Published by Macmillan. Pp. 653. 15s. net.)

The purpose of this book is to select from the methods of educational research those which are applicable to the problems of the class room and to develop such other methods as are needed to attack those problems with which genuine research has little to do.

The authors analyze the chief problems which have to be solved in actual teaching and give master lists of useful data, sources of data, and methods of obtaining data. Typical problems involving: the Curriculum, Methods of Teaching, and Management are presented, and the methods of solving are described. The last chapter discusses important general techniques.

The book will be found useful by research workers, students of education, and those teachers who wish to bridge the gulf between empirical attempts to solve difficulties and laboratory studies in educational psychology. A.E.C.

The Fundamentals of Public School Administration: By W. REEDER. (New York: The Macmillan Co., 1930. Pp. 579+viii. 10s.)

This volume, from the pen of the Associate Professor of School Administration in the Ohio State University, is an attempt to discuss the major problems in the administration of a local school system. The author has drawn wisely from his wide and long experience, and has produced an interesting and well documented volume which covers a very wide field. The book should be of real value to administrators in America, and many English students will find much of interest in it.

The Growing Boy: By P. H. FURFEY. (New York: The Macmillan Co. 1930. Pp. 192+viii. 8s. 6d.)

Dr. Furfey, probably known to many as the author of *The Gang Age*, has given us an interesting sequel in this volume, in which, by using the "Case Study" method, he has outlined his particular views regarding "Developmental Age." "The present study is concerned with the development of personality in boys between their sixth and sixteen birthdays."

Dr. Furfey has made excellent use of his opportunities of trying to know and understand the growing boy, and readers will be interested in his studies. Not all of his generalizations will be readily accepted by English students.

Each chapter is followed by a useful bibliography.

Counseling the College Student: By HELEN D. BRAGDON, Ed.D. (Harvard University Press. Pp. xi+137, Appendix and Bibliography. 11s. 6d. net.)

An educational institution of post high-school grade is necessarily concerned with many varying problems of student life. College and university aim at being more than mere knowledge shops where so much information can be obtained at a price; but although this further aim has been recognized for a long time it is difficult to administer for it. Casual treatment no longer suffices, and now a growing literature centres around the topics of exploration, guidance, and attention to the individual, indicating how the problems of student life are being thoughtfully considered; the present volume deals with the Freshman and the particular problems set up. On the whole the cultural opportunities afforded in places of higher education are good and numerous, on the social as well as on the academic side. Yet, notwithstanding the sound sense shown by students in organizing their social and extra-academic activities there are many instances of Freshmen who for one or another reason cannot take advantage of what college has to offer; indeed it is well known that they hardly realize what a university stands for. This is only one example of the student problem; another aspect is got from the angle of those unorganized influences, whose name is legion, which are brought to bear on the happiness and efficiency of the student, and which are all the more difficult to deal with because they are so hard to trace. Dr. Bragdon lists the principal incentives towards a college career; it is curious that of the total of the students with whom she has been concerned in this enquiry so few are in the first place urged by cultural or professional motives. There is an analysis of the students' accounts of the changes they have undergone in their Fresher Year and the achievements they have wrought; among the troubles there are conflicting domestic forces of parental disapprobation towards college life; once in college the student is subject to disturbance in several forms and may find advice very helpful. But how and by whom can it be given? Dr. Bragdon makes it clear that advising cannot be anybody's job. Experience, personality, sympathy, tact, and other qualities are essential in the "counselor"; the student must be helped to state his case; the problem may have to be recast; it may have to be looked at from different points of view; sometimes there is inability to state the nature of the trouble. Amongst a list of 271 problems cited in this book are those due to health, emotional disturbance, over-activity in some social department of the institution; while problems of over-activity in academic life are less frequent, they occur; adverse home conditions and worries are met with. The path of the "counselor" is interesting, but it is not easy; he must know what he is counselling about, whom he is counselling, and to what end; above all it must be certain that something happens as the result. Advising follows diagnosis; not only should the "counselor" be able to gain the student's confidence but he should be able to help, perhaps reconstruct, and ensure a means of following up the case with a programme of action, which may be in the form of a plan for extra-curricular activity, special attention from members of the faculty, a contract with the student, giving instruction in phases of psychological development, consultation with the family and fresh living arrangements, securing a salaried position for the vacation or arranging for a loan.

He whose office puts him in the position of "counselor" to students will recognize many of his own familiar friends in Dr. Bragdon's analysis of problems.

He may happily recognize in himself the qualities that a " counselor " should have, but after reading this book he will certainly know a great deal about the manner of man he ought to be and be encouraged to look on his task as well worthy of the best he can put into it on account of its high social service.

" Counseling the College Student " is written in an American setting, but its principles are universal, and British readers can profit from it without any trouble in rearranging the background. A.P.B.

The Retreat from Parenthood: By JEAN AYLING. (Kegan Paul, Trench, Trubner and Co. Pp. 293. 10s. 6d.)

In spite of the title of this book the main idea is of distinct relevance to the psychology of the training of children. The author is concerned with the decline of the birth rate of the professional classes and with the strong desire of some women to continue their own professional career and yet marry and have children. In addition she is oppressed by the thought of homes in which the mother is of this type, and which are spoiled by the advent of children. Unfortunately the number of cases which she describes are so mixed up with obviously imaginary cases of unhappy homes that it is very difficult to see how much evidence she really has for her thesis. Her solution is the institution of child rearing services where the children, after a few months from birth, are brought up entirely. It will be seen that the whole question is at issue of the value to the child of the specific affection of the parent on the one hand, and on the other the danger, as undoubtedly exists in many homes, of such affection and petting being really carried to excess and being harmful to children. The author does not, it seems to me, allow sufficiently for the possibility of complexes and irritabilities, and so forth revealing themselves in those who take over the charge of the young children. Does she imagine that all the teachers in our schools are perfectly well balanced individuals who will treat the children without prejudice or emotional disturbance or the influence of " complexes ?" However, the book makes an interesting challenge, and no doubt there are a number of homes in which her suggestion would provide a good solution to a difficult situation.

The Modern Parent. A Guide to Everyday Problems: By G. C. MYERS, Ph.D., with an Introduction by M. V. O'SHEA. (London: Williams and Norgate, 1930. Pp. 350. 8s. 6d. net.)

This book deals with many types of minor misbehaviour among children, and gives suggestions to parents as to the mode of treatment. It makes no pretence to being a systematic psychology of the difficult child, but it does supply a certain amount of material of use for that purpose.

The suggestions seem to us generally sensible, although there may be a tendency to a too ready generalization, and to a minimizing of difficulties of diagnosis and treatment. Few parents or teachers, however, could read the book without getting a great deal that is suggestive and useful.

FOREIGN JOURNALS.

ZEITSCHRIFT FÜR PÄDAGOGISCHE PSYCHOLOGIE. January, 1931.

Die Frage der Lehrerpersönlichkeit vom Schüler aus gesehen: By DR. M. KEILHACKER.

This is an attempt to get some exact knowledge of the views of young people as to their ideal teacher. Even if their statements are incomplete it is important to know what is the scholar's ideal of what the teacher should be. Some 2,000 essays have been collected in response to the question " Wie wünsche ich mir meinen Lehrer ? " These come from all ages, from 8 to 20; from all sorts of schools, elementary, higher and vocational; from very various districts, east, west, north, and south; rural and urban, from boys and girls.

The most striking result is that the ideal type of teacher changes with the mental development of youth. The influence of environment or of type of school is much less important,

All ages and both sexes demand that discipline and order must reign, that teachers must create respect and maintain authority. But servility to do-as-you-are-bid orders is emphatically refused by older boys. The teacher must be educator and friend, not taskmaster.

There are seldom any complaints about incompetence in specialist knowledge, but more frequently and from older classes complaints about lack of general culture and wide interests. The teacher should be able to answer questions outside his speciality. A wide-minded, many-sided, large-hearted man is wanted. The most frequent complaints are about teaching methods and didactic competence.

There are very frequent demands both from boys and girls for teachers who can lead summer excursions, and in winter take them ski-ing, tobogganing, and skating. No wish is so persistent through all ages as the demand for justice. Some fifty to seventy per cent emphasize this. Injustice produces bitterness.

When age differences are considered the younger scholars demand not too much homework, clear and interesting teaching and excursions. The teacher should join the game, not stand aside sullen and peevish. At age thirteen they are hardly troubled about teachers setting a good example.

From Obertertia (average age fifteen) come quite different demands, e.g., for a good example, training scholars to be good men, standing by with counsel and deed; teachers must hold the confidence and attachment of their scholars, must be approachable for advice.

Higher stages are still more emphatic in demanding a personal relationship, a capacity for friendship to bridge the gulf between teacher and scholar. The teacher must be a counsellor in life's puzzling questions. At eighteen years the demand is for humanity and understanding free from school discipline. H.R.

VOLUME I. JUNE, 1931. PART 2.

MODERN TRENDS IN INFANT PSYCHOLOGY.[1]

BY V. HAZLITT.

(*From the Department of Psychology, Bedford College, London.*)

I.—*The recent development of interest in infant psychology.*
II.—*Review of work published during the past decade on the following aspects of the subject:*
(*a*) *Reflex activity.*
(*b*) *The effect of practice versus maturation.*
(*c*) *The emotions and the social life of the child.*
(*d*) *The development of thinking.*
(*e*) *Norms of development.*
(*f*) *The ways of dealing with psychological problems that arise.*
III.—*Psychological aspect of the nursery school movement.*
IV.—*The danger of subordinating fact to theory in infant psychology.*

I.—THE RECENT DEVELOPMENT OF INTEREST IN INFANT PSYCHOLOGY.

THE total number of careful studies of young children before the beginning of this century could be counted on the fingers of one hand. Pestalozzi kept a diary of a young child for a short time. Tiedemann's record of his son's development during the first few months formed a very delightful beginning for infant psychology, but it was not followed by anything of importance for nearly a century. Then Preyer's painstaking notes on the development of the faculties, founded upon the study of his own child, appeared. The beginning of the twentieth century was marked by the best single study of a young child that has appeared even to the present day. Miss Shinn in her *Notes on the Development of a Child* gave first-hand observations made with the greatest care and independently of theoretical discussions, which are given in a separate volume. The work was full of promise for the future, but the promise is only now being fulfilled.

[1] This is the first of a series of articles we hope to publish dealing with important recent developments in various aspects of educational psychology. Further articles will include papers on Present Tendencies in Vocational Selection, and on Vocational Guidance, by Mr. Eric Farmer; and another on the Gestalt Psychology and its bearing on Education, by Miss M. Hammond.

II.—SUMMARY OF WORK THAT HAS BEEN DONE DURING THE PAST DECADE.

Several paths have converged recently upon the field of infant psychology, some of them starting from quite distant territory. The result has been an extraordinary increase in the prospecting, and the discovery of some rich seams. Amongst interests that began quite outside the field and that have led into it are those linked with the Behaviourist applications of Conditioned Reflex Theory and with Gestalt, respectively. The importance of these has lain not so much in the observations to which they have given rise as in the attitudes and the forms of explanatory hypothesis which they have favoured. Their influence will be more readily appreciated after the work within the field of infant psychology itself has been considered. Among the outstanding names of those who have been studying young children are those of Baldwin, Blatz, Bott, Charlotte and Karl Bühler, Gesell, Isaacs, Klein, Piaget, Stern, Valentine, and Watson*. The work of Stern and of Karl Bühler came earlier than that of the group which is of chief interest for the present-day student. It is obviously impossible within the limits of a short article to do justice to the wealth of output. The most that can be attempted is a summary of what seems to the writer the most significant elements.

If we begin by considering the simplest form of behaviour, the reflexes, the outstanding contribution of recent research is seen to be the revelation of the unity of the organism, even at this level. For instance, the infant for a while after birth can support his own weight by clinging. But he is much more likely to do this when angry or afraid than when happy and peaceful. Again, Valentine gives records of children stopping reflex activity such as sucking and crying to attend to interesting stimuli such as light or music.[22] The same picture is revealed in the work on conditioned reflexes. The child of three or four weeks sucks at the sound of a human voice. During those few weeks of life the sound of human voices has usually accompanied preparations for nursing. Because of the unity of the child's nervous organization, they have now come to call out the reflex which could be elicited only by touch stimuli at first. Many psychologists, in their revulsion against the Behaviourists' attempt to explain all modification of behaviour by conditioned reflex theory, have failed to appreciate the great importance and interest of the theory in relation to the development of very young children. The modern nurse holds the child out on a vessel from birth at the natural times for voiding and defecation, and with a great many children she thus ensures that they are very seldom soiled and that there

*For titles see bibliography at end of article.

is little difficulty later in establishing habits of cleanliness. The touch stimulus of the vessel becomes associated with the reflex and calls it forth automatically.

Watson has stressed the conditioning of emotion in young children. He holds that only loud noises and withdrawal of support originally arouse the emotional reflexes of shrinking and crying.[26] All other objects of fear become so through experiences in which they have been associated with these. It will be maintained in a later paragraph that this view is open to criticism in as far as it claims to be an explanation of all fears. Within a narrower province, however, the work upon which Watson bases his theory certainly has interest for the educator and psychologist. Watson found, for example, that a child who had not previously feared a white rabbit came to do so through experiences in which a loud noise frightened him as he was attending to the rabbit, and the fear spread to a number of other furry things. The implication of this is that the little child exposed to frightening experiences, the scolding of ignorant parents, or bullying and teasing of other children, is having his whole world infected with the paralysing effects of fear.

The influence of practice upon the perfecting of activities that develop in the child has recently been studied by the method of co-twin control. Identical twins are measured in their performance of some given activity, such as climbing, before facility in it is fully developed. Then one of them is given specific opportunities for practice every day for a few weeks, while the other is not. Finally both are again tested. These studies show that maturation has much more effect than specific practice. The unpractised twin was scarcely at any disadvantage as compared with the practised one. It is doubtful if the conclusions from the studies under consideration should be accepted without reserve. The specific practice periods were short and we are not to suppose that the child who was not encouraged to practise abstained from it. In any case the difference in practice between the two would amount to only a few minutes per day for a few weeks.

The emotional life of the child has been studied in a number of different connections; the bases of fear have been specially considered by Valentine[23] and Watson[26]; the Psycho-Analysts[11] have been concerned with the emotional conflicts in the life of the young child; a number of other workers have been interested in emotion in relation to the development of social adjustments. It has been mentioned in an earlier paragraph that Watson traces the fear of all the different objects and situations feared to their association in experience with one or other of the two natively fear-arousing phenomena of loud noise and withdrawal

of support. Valentine in a very delightful study of the manifestations of fear in his own children shows that some of them manifested fear of things that they had not seen before and of other things to which it was extremely unlikely that they had been conditioned.[23] Fear of furry objects, slimy things, grotesque masks and grimaces, are so common the world over that it seems extremely unlikely that there are not innate bases for them. The reason that they do not all develop in all children is probably that, as with all reactions, the setting is important. A child may be predisposed to fear furry things, but if care is taken to accustom him to them without shock and to ensure happy associations with them the fear may never develop.

Psycho-analysts who have been working with very young children stress the richness of the emotional life of the child under three and the seriousness of the conflicts to which his desire to possess entirely his beloved objects, mother or nurse, may lead. The Analysts claim that children may be helped to adjust to life by dramatising their wishes in play without reserve in the presence of the Analyst who adapts his technique to their age and special circumstances.

In the past there has been a tendency to ignore the social life of the very young child and much has been written about his ego-centrism. To-day the emphasis is changing. Frau Bühler and others note, in children under twelve months of age, responses to people and pleasure in company apart from the satisfaction of needs; sensitiveness to strangers; joy in the presence of other children.[4] Mrs. Isaacs maintains that social development is continuous.[9 and 10] Recent studies of children in clinics and nursery schools show that while these little ones do not enter into organized social activity to any degree they are constantly making brief social contacts.[19] They are not oblivious of their companions although they pursue most of their pastimes individually.

Marston has carried out some original studies of children with a view to discovering whether they show introvert and extravert tendencies in the early years.[13] He invented situations in which the child's fear of strangers, aggressiveness, perseverance, and concentration of attention were measured on scales ranging from nought to five. He found that even amongst children of two and three years of age there were individuals who were markedly introvert and extravert respectively.

Children's thinking has been studied more during the last decade than any other of their activities, and the results have led to some interesting discussions. Most of this work is relevant to the child under three by implication rather than directly. Alpert carried out a study of problem solving in children ranging from nineteen to forty-nine months

of age.[1] She modified Köhler's situations, involving the use of boxes and sticks to reach desired objects, to make them suitable for little children. She gives some very interesting accounts of individual behaviour and some practical applications of special interest to the teacher. Her results show that children of two, anyway, may solve such problems with insight. "Two Parents" in their records of the scientific interests of their little son show that for the period with which they were concerned, two to four years of age, the child gave evidence of trying to understand his world and by four years of age he was asking some questions of a purely causal nature.[21] Piaget's monumental works are in the main concerned with the thinking of children over four years of age.[14, 15, 16, 17] His data were collected from observations, conversations, and experiments carried out with children in the Maison des Petits. From his results he argues that the child is non-social and ego-centric to seven or eight years of age, and that therefore he commits certain errors in thinking such as making two unrelated phenomena casual the one to the other (Syncretism), and inferring from one particular instance to another without considering whether there is ground for such inference (Transduction). He regards the child's thinking as essentially different from that of the civilized adult, as animistic and in other ways similar to primitive man's. He marks stages in the child's thinking which are limited by the rate of maturation.

Isaacs, basing her contentions on the detailed records of a number of children from under three years of age upwards, argues that in as far as the child's attitudes and processes approximate to those described by Piaget, the cause lies in his ignorance and his unfamiliarity with the given material.[10] The adult's thinking shows the same characteristics when he has not the requisite knowledge. She would say that the child's processes of thinking are not fundamentally different from those of the adult, they seem so only because there are many more fields in which his knowledge is inadequate. She gives a wealth of illustrations to show how acutely and perseveringly children puzzle out solutions to their own problems. The key to the differences between the results and theories of Piaget and Isaacs probably lies in the words, "*their own problem.*" Piaget's subjects were thinking at the behest of an adult about matters quite remote from their interests of the moment before. "Two Parents" mention that their son could not answer questions posed to him by an adult without reference to his immediate interests, although they might be questions which he had helped to solve previously when they occurred to him spontaneously. A problem which Piaget does not appear to consider seriously is how far the appearance of stages in the children's

thinking may be due to the particular development of subjects in the curriculum of the school which they all attend. It would be interesting to repeat his experiments with children in very widely different types of school and to compare the results.

Piaget in his review of Isaacs' book has taken up her objections to his own work.[18] He agrees that his method of questioning was open to criticism on the score that suggestion could not be avoided, that it was artificial, and that the subject matter of many of the questions would come in the school curriculum. He says that, all the same, the tendencies to realism, magic, animism and artificialism were present in the children's answers. In his discussion of the interpretation of the results he ascribes the difference in view between Mrs. Isaacs and himself to the confusion between the structure and the function of thinking. He would agree with Mrs. Isaacs that as regards function, thinking is always identical with itself, but as regards structure he maintains that it is plastic and changes. His conception of stages and of maturation applies to structure. He makes quite explicit that he regards this maturation of structure as intimately dependent upon experience: " C'est donc la relation intime et indissociable entre la maturation et l'expérience qui est le fait premier, et non l'expérience comme telle ou la structure conçue comme une pure forme. Dès lors il est évident que la structure variera en fonction de l'expérience " (p. 151). It seems to the present writer that Piaget, in taking this view, is forced ultimately to the conclusion that there are as many structures as there are different subject-matters of experience, which means that there is no practical difference between regarding maturation as the development of experience and regarding it as the maturation of structures.

This is not the place to enter into one of the liveliest discussions of modern psychology, but the interested reader who is not familiar with the literature is advised to read the children's answers to the questions given in *The Child's Conception of Causality*.[17] and to ask himself if the ways of thinking demonstrated call for such hypostasizations as are Piaget's animism, artificialism, syncretism, transduction, and so forth. When the youngest children are asked about matters beyond their ken do not they just give back the kind of answers that adults have given them, e.g., "God made it?" And later are they not groping after something connected with the effect, at first no matter how, later more and more nearly in time and space? Naturally, as Piaget would admit, they first of all think of the action as being similar to the actions of which they have immediate experience, and this tendency only gradually disappears. Huang has made a very interesting study of how children

explain strange physical phenomena.[27] His range of age groups was from five years upwards and he asked them about a variety of simple experiments that he performed in front of them. His results lead him to make the same kind of criticisms of Piaget's theory as have been suggested.

Work on the development of the child.

In addition to the researches upon special subjects with which we have been dealing there have appeared several books founded upon first-hand study, which deal with the development of the child as a whole. These fall roughly into two main groups. The first group* enables one to form an extraordinarily detailed picture of the development of the child, month by month, from birth to about three years of age and to measure any given child's development in comparison with others of the same age. The second group† is primarily concerned with the psychological problems that arise in early development and their treatment. They should be of the greatest use and interest to parents, nurses, and teachers. It is significant that only one writer of all the series quoted is English. While we have several excellent nursery schools and a number of clinics for children, none of them is as yet a centre for psychological research, whereas in America, Canada, and some European countries this work is being carried out by highly qualified research workers in collaboration with social workers and teachers.

III.—PSYCHOLOGICAL ASPECTS OF THE NURSERY SCHOOL MOVEMENT.

We in England are not yet alive to the importance of the development of nursery schools from the psychological point of view. Many are prejudiced against the whole movement, because the use of the word "school" suggests that children of two and three are going to be submitted to a routine and *taught*. If this were true the psychologist should be the first to protest, for he realizes that the child at these ages has endless problems and interests which he can pursue only if he is

* Gesell, *Mental Development of the Pre-School Child.*
Stutsman, *Mental Measurement.*
Baldwin and Stecher, *The Psychology of the Pre-School Child.*
Bühler, *The First Year of Life.*

† Blatz and Bott, *The Pre-School Child.*
Fenton, *Practical Psychology of Babyhood.*
Isaacs, *The Nursery Years.*
Rand, Sweeny, and Vincent, *Growth and Development of the Young Child.*

left alone in the right environment with the possibility of help when he looks for it. He cannot take over from someone else this, that, or the other interest at a given time and in a prescribed form. But the nursery school does not demand this. Apart from the cessation of other work in favour of meal times and washing, it scarcely makes any routine demands on the child. Ideally, and actually in most cases, the nursery school is simply a well-equipped nursery and garden with understanding adults to see that all goes well and to give help when it is needed. What are the arguments for such an institution from a purely psychological point of view? If the children concerned come from ill-regulated homes (whether poverty stricken or wealthy) it is obvious that to go daily into a good environment will favour the formation of better attitudes and habits than would be possible for them in their homes. But even for the children from fortunate homes the nursery school has its rôle. In the home, whether there are other children or not, the youngest child is liable to have very limited possibilities socially. He is likely to spend the bulk of his time with just the one or two people who are devoted to him. The result is that all his affection is bound to centre in these individuals so that by the time that he is three or four years of age separation from them is agony and he finds it exceedingly difficult to form new attachments. If from an early age he were accustomed to spending part of his time in a different environment this painful situation might be avoided with very great gain to the child. In the nursery school, social conduct would not be forced upon him, but, being with others, he would gradually enlarge his social world.

Another psychological argument for nursery schools is the effect of change of environment upon emotional mood. The adult who has become peevish or irritable with his social environment at home or at work realizes with what relief he puts on his hat and coat and goes to join the other group. If the young child differs from us in this, it is probably in the direction of being in greater need of such change, because when he is out of tune with his world he has less capacity for realizing what is wrong or for adjusting to the difficulty. Mother, nurse, the home nursery, or the " back parlour " will all be appreciated more by the child who gets away from them for a few hours each day.

So far we have considered the nursery school in relation to the child's immediate psychological needs. There is a longer view. The nursery school may be used as a means of studying young children, about whom it is extraordinary how little we know. The results of such study would in time increase our understanding of human development and so have far-reaching effects upon education.

IV.—THE DANGER OF SUBORDINATING FACT TO THEORY IN INFANT PSYCHOLOGY.

It was said near the beginning of this article that Gestalt and Behaviourist theories have influenced the development of child psychology. A more accurate way of expressing the matter would to be say that the development of psychological thought (two extreme outcomes of which have been crystallized in the so-called Gestalt and Behaviourist theories respectively) has given rise to fruitful methods and discussions in this field of psychology as in others. Atomism and the Faculty Theory, which were even more disastrous and more persistent in child psychology than elsewhere, have been fighting a losing game since the early work of Ward and Stout. But in child psychology we are still faced with the danger of theory being exalted above fact. Anyone who is not convinced of this should contrast Valentine's work on fear with that of Watson; a book founded on observation such as that of Gesell, *Mental Development of the Pre-School Child*, with Koffka's *Growth of the Mind*; Isaacs' *Intellectual Growth in Young Children*, with Piaget's work on the same subject. Watson, Koffka, Piaget, pour whatever they discover themselves, or find in other people's observations, into moulds scarcely less rigid or more truly cast than those of the Atomists and Faculty Psychologists. It is the careful search for facts regardless of theoretical implications, the study of children for the sake of knowing about children, that will make of child psychology a science upon which in the future it may be possible to build theories of the greatest importance.

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RÉSUMÉ.

TENDANCES MODERNES DANS LA PSYCHOLOGIE DES JEUNES ENFANTS.

Pendant les dix dernières années on a poursuivi un nombre considérable de recherches sur les jeunes enfants. Les résultats du travail dans les champs divers sont les suivants :

(a) Les Réflexes. On a démontré l'influence de la condition émotive.

L'application de la théorie des réflexes conditionnels au comportement des petits enfants a révélé comment on peut, en systematisant le milieu, encourager les réactions routinières.

(b) L'Exercice par Opposition à la Maturation. Par suite du travail sur ce sujet on prétend que l'exercice n'a qu'une importance relativement petite en comparaison avec les activités qui se développement d'elles-mêmes chez l'enfant.

(c) La Vie Émotive. La théorie de Watson que la plupart des craintes enfantines sont occasionnées par leur association avec de forts bruits ou une instabilité de soutien a été contestée. On a étudié les conflits émotifs chez les enfants. On a prouvé l'existence de tendances sociales dès la première année de la vie.

(d) La Pensée. On a accompli sur ce sujet un travail très important qui a suscité de vives discussions sur l'influence relative de l'expérience et des structures de la pensée.

(e) Les Normes de Développement. Plusieurs travailleurs ont publié des " tests " standardisés embrassant chaque mois de la vie depuis la naissance jusqu'à l'âge de trois ans.

(f) Façons de Résoudre les Problèmes Psychologiques de L'Enfance. Ce sujet a été traité par plusieurs écrivains qui ont eu de l'expérience immédiate dans des cliniques ou des écoles maternelles.

Le changement quotidien lorsque l'enfant passe de la maison à l'école maternelle lui fait du bien du point de vue psychologique, puisqu'il l'habitue peu à peu à des ajustements sociaux, produit une détente émotive et lui offre des activités et des intérêts beaucoup plus variés qu'il n'en aurait à la maison.

Il existe un danger que la psychologie du petit enfant ne devienne le champ de bataille des théoriciens. Ceux qui ont travaillé dans l'intérêt de la théorie seule sont loin d'avoir contribué autant au progrès du sujet que ces observateurs qui, sans préjugés, ont soigneusement collectionné les faits.

ÜBERSICHT.

MODERNE RICHTUNGEN IN DER KINDERPSYCHOLOGIE.

Während des letzten Jahrzents hat man eine Anzahl von wichtigen Beobachtungen junger Kinder gemacht. Die Ergebnisse der Untersuchung in den verschiedenen Wirkungskreisen sind folgende:

(a) Reflextätigkeit. Die Wirkung des Gemütszustandes des Kindes ist schon bewiesen worden. Die Anwendung der Theorie der konditionierten Reflexbewegung auf das Benehmen des Kindes hat darauf hingewiesen, wie dessen Umgebung eingerichtet werden kann, um gewohnheitsmässige Reaktion zu befördern.

(b) Übung gegen Reifen. Nachforschung über dieses Thema hat die Behauptung herbeigeführt, Übung sei von verhältnismässig wenig Bedeutung in Bezug auf sich im Kind entwicklelnde Tätigkeiten.

(c) Das Gemütsleben. Watsons Theorie, dass die meisten Besorgnisse durch ihre Verbindung mit lauten Geräuschen oder Unbeständigkeit der Unterstützung konditioniert werden, hat man in Frage gestellt. Über Gemütskonflikte bei Kindern ist nachgeforscht worden. Gesellschaftliche Richtungen während des 1. Lj. hat man erklärt.

(d) Denkvermögen. Über dieses Thema hat man sehr viel nachgeforscht, welches lebhafte Diskussionen betreff des relativen Einflusses der Erfahrung und des Aufbaues der Gedanken veranlasst hat.

(e) Normen der Entwicklung. Verschiedene Forscher haben normierte Prüfungen veröffentlicht, die jeden Monat von 0 : 0 bis 3 ; behandeln.

(f) Behandlungsweisen für psychologische Probleme der Kindheit. Dieses Thema ist von einer Anzahl von Verfassern behandelt worden, die Erfahrung aus erster Hand in Kliniken und Kleinkinderschulen gehabt haben.

Die tägliche Änderung der Umgebung zur Kleinkinderschule hilft dem Kinde psychologisch, weil sie es allmählich an soziale Berichtigungen gewöhnt, Gemütsspannungen erleichtert und ihm eine grössere Auswahl von Beschäftigungen und Interessen anbeitet als es zu Hause besitzt.

Die Kinderpsychologie läuft Gefahr das Schlachtfeld der Theoretiker zu werden. Theoretische Untersuchungen haben bei weitem nicht so viel zur Entwicklung des Themas beigetragen als die sorgfältige Zusammenstellung gegebener Tatsachen durch Beobachter ohne theoretisches Vorurteil.

RETROSPECTIVE AND PROSPECTIVE ANALYSIS IN CHILD PSYCHOLOGY.

By JEAN PIAGET.

(*Translated by Elizabeth W. Tait.*)

The greater part of the controversy to which my publications have given rise reduces itself to the opposition of two points of view regarding the child: a prospective or functional point of view and a structural or retrospective one. Is it possible to reconcile these two points of view, i.e., are they really points of view or are they mutually exclusive? In other words do they involve incompatible theoretical interpretations? That is the question we wish to examine here, for it, and it alone, dominates the whole discussion.

In order to do this we do not intend to limit ourselves to an abstract deduction, but to take up the analysis of facts at the point at which it was left by one of the subtlest and profoundest of our opponents, Mr. N. Isaacs. In an extremely suggestive "Appendix" to the recently published work of Mrs. Isaacs,* Mr. Isaacs has studied the "whys" of the child from the functional and prospective standpoint and has devoted himself to a "reinterpretation of my own findings.† In the spirit of synthesis and subtle abstraction characteristic of him, Mr. Isaacs opens out for us, in this appendix, a conception of mental development which may be considered typical of the prospective point of view, as held by an empiricist who distrusts any kind of "structural" notion. We wish, therefore, briefly to set forth Mr. Isaacs' conclusions and to undertake, in our turn, an attempt at "re-interpretation" of those conclusions. Better than any abstract discussion, this mutual "re-interpretation" will, we hope, serve to convince the reader of the complementary, and in no sense contradictory, nature of our respective points of view.

The essential element in the acquisition of knowledge is, according to Mr. Isaacs, the unforeseeable impact of an anticipation of the mind on the resistance of material things. Let us then analyse these two terms. The anticipation of the mind is due to the numerous mnemonic factors with which the subject is equipped at the various levels of his development: sensory-motor association, habits, recollections, etc. Every expectation

**Intellectual Growth in Young Children.* (Routledge, 1930.)

† *Vide* pp. 322-3 and p. 334: "Attempt at a reinterpretation of Piaget's finding."

is therefore the result of past experience, and manifests itself in the form of a kind of anticipative schema (or assumption) which is the source of generalizations or of laws, properly so-called. As for the resistance of outside things, it is merely direct experience.

Direct experience may confirm or nullify the expectation of the subject. If the expected result is produced the mind just continues the work of generalization and the schema of anticipation thereby assumes the force of a law. But the reverse is possible; anticipation comes up against an obstacle which closes the road to any generalization. It is then that the mind comes consciously into touch with reality and that a question arises.

Many of the questions put by children merely exemplify this simple mechanism.* For example, " Why do your teeth break if you bite stones?" (age 4 : 0; " The radiator is cold, why ? " (4 : 0); " Why has the cave to be so dark ? " (3 : 6). The child is accustomed to finding teeth resist any sort of food, to radiators being warm, and to seeing clearly in broad daylight. Reality offers unexpected obstacles to the anticipations arising from such habits, the stone threatens to break the teeth, the radiator is cold, the cave dark. Hence the question put, which is an indication of the failure of the mind, faced with unexpected facts, to adapt itself. The question implies a law, an exception to that law and an effort to overcome the exception. What is to be the result of this conflict between the expectation and the unexpected obstacle ?

Several results are possible. In the first place the child may try to correct his assumption, i.e., to take account of the exceptions, to explain them and to fix the meaning of his assumption within the new limits thus set. For example, " The radiator is cold, Why ? "—Because they have let the fire go out. " You know, because the sun is shining, they have put out the central-heating. The stove is cold, you know, if there is sun. The stove ought to be put out for it is warm already because of the sun." One can see how the child deals with the exception by introducing it into a new law, and thus safeguards, by limiting it, the original law. " Radiators are warm " becomes " Radiators are warm when there is no sun."

In the second place the child may try to overcome the obstacle itself by defining clearly its significance. Thus, faced with a new machine which disconcerted his anticipations, a child of 3 : 6 asked, " Oh, is a

* Since we entirely agree with Mr. Isaacs in what he affirms (if not in what he denies) we take over his thought and freely expound it here, illustrating it with new instances taken from the questions collected by Mme Leuzinger in her study of the language of some children of 3-4 years. (*Vide* our book, *New Studies of Logic in Children*, to appear shortly.)

machine like that? Has it a motor? Can it work? Then the motor will be able to work too?" Here it is the possible obstacle which is criticized before it contradicts the previous assumption.

In the third place the child may differentiate his schemas. This operation is already suggested by the foregoing, but it becomes complete when the original law is divided into two and when the two laws thus constituted require more or less independent explanations. Mr. Isaacs quotes a good example of a child enumerating a series of animals which lay eggs, then a series of viviparous animals, to reach the conclusion, ultimately, that man himself is a viviparous animal. One might cite too the example of this child of 3 : 8, "Why do spectacles break easily?" The law, hitherto accepted, was based on habitual dealings with unbreakable articles. The mental obstacle to the law is spectacles which break easily. The child immediately suspects the existence of a new law which would embrace the case of spectacles as of other objects made of glass, etc., and would thus necessitate a differentiation of the original law.

Fourthly there appears a more radical solution : the original law is recognized as false and the mind is directed towards new schemas.

Finally, the fifth solution, the mind, incapable of finding out new laws which might get round the obstacle, may as a last resort turn back upon itself and revise its method. In other words, its activity, hitherto directed towards the outside world, may now include, in addition, a "becoming aware" of the method followed, reflection on that method and an effort to revise it.

Such is the character of cognitive activity : a progressive organization of experience proceeding by way of extension, revision, and differentiation of anticipated schemas, i.e., by simultaneous co-ordination of facts and of methods. Now this activity, Mr. Isaacs tells us, is the same everywhere, in the child who puts questions as in the scientist who experiments. The mobility of the schemas which are at once "constructed" and "constructive" does not in any way contradict the permanence of the functional process. All the real questions put by the child ("epistemic" as Mr. Isaacs calls them in opposition to automatic questions or those put merely to acquire information) fit into this framework.

Before trying to discover whether this theory excludes every structural or retrospective view or whether, on the contrary, it implies such a one, let us first try to clarify certain points of language. Mr. Isaacs prefers exclusively the language of experience as being clearer. He has the greatest distrust of the words reason, logic, categories, structures, and everything in his thought is expressed in terms of external facts and of

functional activity. It is very useful, despite appearances, that such linguistic divergences should exist among psychologists, for they alone prevent rationalists from turning reason into an entity, and empiricists from reducing it to a mere register of experiences passively undergone. Having noted this, let us show briefly in how far Mr. Isaacs' account may be accepted by every one and how it may be translated even into terms which he tends to suspect, perhaps too strongly, of " logicising " bias.

Experience, as conceived by Mr. Isaacs, is something subtle. It is not the mere contact of a mind already formed with things already fixed, a contact which enables the mind either to form associations or, as is said to-day, to " educe " relationships. It is a contact which presupposes preparatory work on the part of the mind, since it presupposes expectation, i.e., an anticipative schema. We are aware that Mr. Isaacs appears to attribute this state of expectation to purely mnemonic factors, that is, once again, to associations acquired by contact with experience. No one would deny him the right to do so, provided always that he makes quite clear that the associations entering into an anticipative schema do not constitute a whole, organized and imbued with cognitive significance, except precisely in so far as there is an anticipative schema. In short when experience replies with " yes " or " no " to the expectation of the mind, it is because there exists a mind to put a question, i.e., there already exists some system, however rudimentary, of interpretations.

In that case what difference is there between Mr. Isaacs' anticipative schemas and what we call " structures " ? None, it seems to us, except that Mr. Isaacs studies them in process of formation, at the moment when on contact with new experiences they either disintegrate or are strengthened, while we have studied them in their origins, as crystallizations of the past activity of the whole subject. The schemas are accordingly, Mr. Isaacs seems to say, at once " constructed " and " constructing " while the structures are purely " structuring." In opposition, however, to the apriorism of static epistemology, we have always stood for dynamic structures. Now, if structures alter with age, it is evident that they are simultaneously " structured " and " structuring " and that they are " structured " by their very functioning. Mr. Isaacs likewise represents us as saying that, at each age, the child shows structures which make it incapable of undergoing modification by experience or social environment, while the anticipative schemas almost invite modification. But here again the difference lies chiefly in the words, and we believe that all structures are more or less plastic. To what extent are they so, or do they offer resistance to experience ? That is a matter of degree, i.e., of level of functioning, intelligence, etc., or possibly of type of structure. Thus

finalist schemas offer far greater resistance to experience than do artificialist ones. But at bottom there is no difference between Mr. Isaac's anticipative schemas and what we call structures. The structure is simply a form of organization of experience, in so far as this organization presupposes, in one form or another, activity on the part of the subject's mind.

Similarly logic, and even formal logic, finds its equivalent in Mr. Isaacs' terminology. When he holds that mental development consists in indefinite differentiation of the external world under the influence of the schemas, and a corresponding differentiation of the schemas themselves, as methods of which the subject becomes conscious, he necessarily grants that to the co-ordination of external experience there corresponds an internal co-ordination, that of ideas and operations. But what do we mean by logic if not this second co-ordination, and what is formal logic, from the point of view of the psychologist, if not precisely the becoming conscious of those methods of co-ordination which we apply to experience, independently however of its content? That there can be no form without content we quite agree with Mr. Isaacs, but he will allow that, inasmuch as the mind, after meeting with the resistance of experience, reflects upon its own methods in order to co-ordinate them, it arrives at increasingly general rules which are consequently further removed from direct experience (deduction, axiom, formulation, etc.).

In short everything may be described in terms of internal activity just as well as in terms of external experience, and if one ceases to fear words like reason, logic, structure, category, one discovers that they mean nothing more than organization of experience, co-ordination of schemas and elaboration of the schemas themselves.

Granted this, what becomes of the opposition between the two points of view (the Conflict with Piaget's Views) of which Mr. Isaacs speaks? A mere matter of perspective. Mr. Isaacs is interested in the questions of the child in so far as they lead the latter on to new knowledge, and his prospective point of view thus remains purely functional. Furthermore, Mr. Isaacs, being, in a sense, a behaviourist, and preferring the terms of external experience to all others, describes the actual adaptation of the child without regard to the internal mechanism of thought, in so far as it assimilates the present to all past assumptions. We, on the contrary, have so far hardly studied the child's thought except in its difficulties, i.e., we have attempted to describe the obstacles which the child had to overcome in order to attain to scientific thought, a point of view which is of necessity retrospective and structural and that led us naturally to choose the terms of internal mechanism rather than those of external experience.

But both points of view are legitimate and the results to which these two distinct methods lead are easily reconciled. This, in the long run, Mr. Isaacs seems to admit when he speaks (page 331) of our two sets of data representing each a different side of the picture.

Let us examine in this respect the main questions which might give rise to a belief in fundamental disagreement when, in fact, it is merely a matter of divergent points of view. The most important seem to us to be connected with the following three points : the degree of generalization appropriate to the schemas, the nature of the laws or causes set up by the child, and the childish interpretation of experience.

A question such as " Why has the cave to be so dark ? " is the result, according to Mr. Isaacs, of the impact of an assumption on an obstacle arising unexpectedly out of experience. There enters then into all knowledge a system of ideas or of laws which the mind forms into generalizations or separates out, and which it revises with the widening of experience. From this point of view the child reasons exactly as does the scientist in the laboratory. Generalization and analysis of exceptions (obstacles to generalization) between them occupy his mind. Functionally speaking this account is absolutely accurate, and we believe with Mr. Isaacs that in every idea, however imperfectly generalized, resulting from this process of anticipation and verification, we find the equivalent of scientific research. Only this does not cover the whole ground, and besides the functional problem there remains a problem of structure. In the child's question quoted above, we may indeed ask ourselves whether the ideas " cave " and " black," the relationship between " cave " and " black," and finally the very relationship indicated by the word " why " have the same meaning as for us. And supposing the sense is not the same, we may proceed to ask ourselves whether this arises merely from difference in knowledge or also from a different manner of organizing experience.

Now the method of approach to a solution of these problems must necessarily be retrospective. Comprehension of what the child means by the words " why," " has to be," " black," etc., implies comparison between the words as used in this question and the same words as used in previous remarks made by the child and involves in the end retracing so far as is possible the history of the meaning of these concepts in the child's mind.

What answer does structural analysis supply to the question as to the degree of generalization involved in the anticipative schemas ? It informs us at once that darkness, or shadow, or night, cannot possibly have for the child the same meaning as for us : they are not simply " absences of light " but substances endowed with force, with mobility, at times even

in a certain sense with purpose.* As for the laws governing these phenomena the child of four is acquainted with certain of them (that night follows day, that bodies produce a shadow when the sun is shining, etc.). But he is ignorant of others (that the shadow necessarily falls in the direction opposite to that of the source of light, etc.). Now when the child reasons about shadow, apart from the specific instance of the question about the cave, it happens that the structural frame-works he employs are neither, properly speaking, laws or general concepts, nor objects distinctly individualized. The shadow beneath the table is likewise that of trees or of night,† etc. In short, neither in the content of the concepts nor in their form are the childish notions of shadow, darkness, night, etc., identical with ours : what proof have we then that these complications do not still remain underneath the surface in the question, " Why has the cave to be so dark ? "

On this first point then the complementary nature of the two points of view is quite evident. From the functional point of view the child's assumption is analogous to the generalizing hypothesis of the adult, it leads on to revised experience and new knowledge. But from the structural point of view, whatever the degree of generalizing it presents, it is not necessarily a general law with exceptions, but may equally well be based on simple relationships of " participation " or syncretic schemas not clearly defined, since any structure whatever may give rise to an "expectation " and to a contact with experience.

The second point leads to similar observations : the nature of the laws or causes worked out by the child. It is clear that if one regards facts exclusively from the functional and prospective angle, as do Mr. and Mrs. Isaacs, one will always see the child at grips with material phenomena and one might then consider the laws and causes which he recognized as being almost entirely of a physical order. From this standpoint the question, " Why has the cave to be so dark ? " means, " How does it happen that this material object which I call the cave is not lit up as I expected it to be, but turns out to be the seat of that physical phenomenon which I call darkness ? " But if once again we study the child not in his externality, so to speak, i.e., in his functional adaptation to the world around him but in his internality, i.e., in the structures which link up his present experience with the whole of his past, matters are no longer so simple. One finds indeed that the question put forms part of a body of analogous questions and cannot therefore be considered as a first beginning : on the contrary it is assimilated to a host

* *Vide* our book, *The Child and Physical Causality*.
† Ibid.

of past problems (this by the way is very clear in the history of science, where geniuses capable of framing a question in absolutely new terms are extremely rare.) Now when one examines this relationship one finds continuity between the purely physical law and the moral or social law, and between purely mechanical causes and pyschological or human forms of causality. Without perhaps actually thinking that the cave is a building built by men and that light and darkness are controlled by human will like the lighting of a house, the child of four will certainly have more difficulty in getting rid of all finalism and artificialism than the physicist of fifty. What proportion of these factors still lingers in the question, " Why has the cave to be so dark ? " Does the term " has to be " still imply some anthropomorphic obligation ? The term " why " some intentionalism ? I cannot supply the answer in this particular case, but the question arises.

Here again one sees to what extent prospective and functional analysis is independent of structural analysis, the latter in no wise hindering the former. In sociology a rite such as baptism may have functionally (in the Protestant Church, for example) the value of a symbol of attachment to the Church : it is none the less, from a structural standpoint, the legacy of a magic ceremony. In individual thought, too, the opposition between function and structure is preserved, only there it is less clearly defined since the individual is more dependent on his own history than is society, not having at his disposal a set of " arbitrary " signs whose content may be renewed with each generation.

One last point : experience and its interpretation. According to Mr. Isaacs, anticipative schemas are the product of the child's past experience and of its cumulative mechanism. We on the other hand have held that contact with experience is something subtle and higher towards which we strive, but which at first is all the more difficult of attainment in that previous subjective and egocentric connections interpose themselves between things and the mind. Here again it all depends on what one is referring to, and from what standpoint. If one takes experience in the sense, for example, of Dewey (to whom frequently Mr. Isaacs comes very close) that is to say, in brief, in the sense of " all that happens," there is no doubt that experience is the only motive force in intellectual functioning from the prospective standpoint, then the child is wholly oriented towards experience. If, however, one lays the emphasis not on experience in the sense of what happens but on the inner interpretation of experience then the primitive stages are characterized by confusion, by failure to dissociate " things " and mind. Let what we have already said as to the child's notions concerning " shadow," his idea of law, etc., serve as proof. And what at

the other end of the scale, in adult science, we call getting hold of things "in themselves" is really to have "constructed" them, i.e., interpreted them in such a way that they form an objective system independent of ourselves. Now structural analysis must necessarily confine itself to the standpoint of interpretation. This does not by any means signify that one ignores experience, or explains the child's successive experiences solely by an internal maturing of structures. It means simply that one follows up the history of "interpretations" and that in these interpretations one lays the chief stress, by a legitimate choice inherent in the nature of the problem, on what proceeds from the subject as opposed to the object.

In conclusion, on these three main problems with regard to which there seemed to be complete contradiction between Mr. Isaacs' solution and ours, one realizes that there is actually agreement and complementary research, so soon as one distinguishes clearly the nature of the problems set. The problem from the prospective or functional point of view is as follows: How does the child's knowledge increase? On the other hand from the structural and retrospective point of view it presents itself thus: How may the child's knowledge be explained, in other words, what is the history of the intellectual instruments employed by the child?

RÉSUMÉ.

ANALYSE RETROSPECTIVE ET ANALYSE PROSPECTIVE DANS LA PSYCHOLOGIE DE L'ENFANT.

Dans sa "Réinterprétation" des résultats de l'auteur concernant les "Pourquoi" enfantins N. Isaacs se place à un point de vue uniquement prospectif et fonctionel. L'auteur cherche à montrer ici que ce point de vue n'exclut pas l'analyse structurale ou rétrospective, mais que les deux points de vue se complètent sans se contredire. Une même question, comme "Pourquoi la grotte doit être si noire?" obéit à la fois au schème de N. Isaacs et au schème de l'auteur. Du premier point de vue elle résulte d'une anticipation due à l'expérience antérieure et contrecarrée par l'expérience actuelle, elle est donc analogue à la recherche scientifique des lois et à l'analyse rationelle, des exceptions, ou des obstacles à la loi. Mais cela n'empêche pas, au second point de vue, d'analyser ce que l'enfant entend par "noir," par "doit être," par "pourquoi," etc. On s'aperçoit alors que ces notions ont une structure différente de celle des notions adultes correspondantes: le "noir" est une substance, le terme "doit" exprime encore une idée d'obligation, etc. Par conséquent la structure est en retard sur le fonctionnement, elle a une histoire en partie indépendante et constitue en somme une sorte de cristallisation du fonctionnement passé.

ÜBERSICHT.

RETROSPEKTIVE UND PROSPEKTIVE ANALYSE IN DER KINDERPSYCHOLOGIE.

In seiner Wiederauslegung „der Ergebnisse des Verfassers über das „Wie" der Kinder steht" N. Isaacs auf einem ausschliesslich prospektiven und funktionellen Standpunkt. Der Verf. versucht hier zu zeigen, dass dieser Standpunkt organische oder retrospektive Analyse nicht ausschliesst, sondern dass die beiden Ansichten sich ergänzen, ohne mit einander im Widerspruch zu stehen. Eine gleiche Frage wie „Warum die Höhle so schwarz sein müsse ?" stimmt zugleich mit dem Entwurf von N. Isaacs und dem des Verf. überein. Aus dem ersten Gesichtspunkt ergibt sich eine Erwartung, die früherem Erlebnis zugeschrieben werden muss und die im Widerspruch mit gegenwärtigem Erlebnis steht. Sie entspricht also der wissenschaftlichen Untersuchung der Gesetze und der vernunftgemässen Analyse der Ausnahmen oder der Gesetzwidrigkeiten. Vom zweiten Gesichtspunkt aber hindert es nicht, wenn man analysieren will, was das Kind unter „schwarz," unter „muss sein," unter „warum" versteht. Man sieht also ein, dass diese Begriffe einen anderen Bau von dem der entsprechenden Begriffe Erwachsener haben ; das „Schwarz" ist ein Stoff, der Ausdruck „muss" drückt noch einen Begriff der Verpflichtung u.s.w. aus. Infolgedessen bleibt der Bau hinter der Tätigkeit zurück, jener hat eine zum Teil unabhängige Geschichte und bildet schliesslich eine Art Kristallisation vergangener Tätigkeit.

THE THEORY OF "TWO FACTORS" AND THAT OF "SAMPLING."

By C. SPEARMAN.

I.—*General theory of two factors.*
II.—*Opposition to the theory of two factors.*
III.—*Theory of "Sampling."*
IV.—*Compatibility of the two theories.*
V.—*Scientific values of the theories.*

I.—The general theory of two factors.

The time appears to have arrived when the long-standing controversy between these two theories has reached such a definite stage that we may usefully take stock of the present situation.

Beginning with the theory of two factors, this was originally formulated as follows:

> "The observed facts indicate that all branches of intellectual activity have in common one fundamental function (or group of functions), whereas the remaining or specific elements of the activity seem in every case to be wholly different from that in all others."
>
> Elsewhere an "other" branch was said to be one that is "dissimilar."
>
> Moreover, the general reservation was made that the whole of this theory must be taken with "*its inevitable eventual corrections and limitations.*"[1]

And after all the intervening years I doubt whether I could do much better now with the same number of words. To render these perfectly definite, however, they had to be expressed mathematically. This was done as follows:

$$a_x = C_a.g_x + K_a.s_{ax},^2 \qquad (1)$$

where the g *and the different* s's (s_a, s_b, s_c, *etc.*) *are all uncorrelated with each other.* Here, a_x represents the score of the individual x in the "branch of activity" or performance a; g_x is the magnitude of the general "function" or factor in his case; whilst s_{ax} is that of his specific factor for the performance a. The capital letters indicate the respective weights of the two factors. C_a has been shown to equal the correlation of a with g; K_a that of a with s_a.

The main evidence for (1) has consisted of three pieces. First, there was a mathematical theorem that this equation holds good when, and only when, the following equation does so :

$$r_{ap}.r_{bq} - r_{bp}.r_{aq} = 0 , \qquad (2)$$

where a, b, p, and q stand for every different four of the performances at issue, whilst the r's denote the usual product moment coefficients of correlation.[3]

The second piece of evidence was likewise mathematical. Equation (2) has reference solely to the "true" correlations ; that is to say, those which would ensue if all sources of error were eliminated ; particularly the so-called errors of sampling, which arise from the experimental subjects being of limited number. Indispensable, then, was some means of estimating the probable size of the sampling errors, so that due compensation could be made for these. This second piece of evidence, however, did not arrive for eight more years, and then only in an imperfect form. For even then we were obliged to renounce usage of the correct criterion (2) and to substitute for it a provisional one ; that of the "inter-columnar correlations" being always unity, or :

$$R_{r_{ax}.r_{bx}} = 1.^{4} \qquad (3)$$

For this (3) it was that we had been able to discover how to compensate for the errors of sampling. But this new criterion, besides some minor defects, had one serious limitation ; it was that of not being in most cases rationally applicable to the whole table of correlations at issue, but only to a portion of them. Such an incomplete application appeared to be in some danger of leading to erroneous conclusions.

Another twelve years, however, brought at last the so long needed correct estimate of the disturbance introduced into (2) by the errors of sampling ; it was the criterion now well-known as that of "tetrad differences." Its discovery signalized the coming of Professor Holzinger on the scene. This new and correct criterion incidentally showed that the errors feared from the provisional one (3) had never in point of fact been realized. For whenever actually tried the two criteria led to just the same results. Still, from that time onwards, of course, the employment of the correct criterion became obligatory.

The third fundamental piece of evidence for the theory of two factors was no longer derived from mathematics, but from observation. It consisted in ascertaining that for all kinds of ability a degree of dissimilarity could actually be found where the correlations, without disappearing, would, on making due compensation for the sampling errors, satisfy approximately both (2) and in general (3).

There remained the task of establishing as definitely as possible the kind and degree of the aforesaid "dissimilarity" involved. Or, what comes to the same thing, the points had to be ascertained at which the performances became so similar that equations (2) and (3) *failed* to be satisfied. In such cases there necessarily existed, over and above any general or specific factors, some appreciable "group" ones also. This fact has also been expressed by saying that in such cases some of the specific factors were not "purely" so, but instead they more or less "overlapped."

In the very first publication of 1904[5] some gross instances of such overlapping or group factors were noted and discussed. And already in the second publication of the present writer two years subsequently[6] demonstration could be supplied that other group factors exist of far less obvious character and correspondingly more extensive range. Since that time the work of my colleagues and myself has been devoted to the study of these subtler group factors more perhaps than to anything else. A formula has been developed for the purpose of submitting the overlap to exact measurement. It is as follows:

$$r_{s_a.s_b} = (r_{ab} - r_{ag}.r_{bg}) / (1 - r_{ag}^2)^{\frac{1}{2}}(1 - r_{bg}^2)^{\frac{1}{2}},^7 \qquad (4)$$

where all the symbols have the same significance as before.

We may now set forth the chief formulas for practical application of the theory. Taking first the case where g has to be measured by a single performance a, and as usual setting the variance of g and s at unity, we get by the well-known regression equation:

$$g = r_{ag}.a + e_g, \qquad (5)$$

where e is an error whose variance $= 1 - r_{ag}^2$.

Similarly,

$$s_a = r_{s_a.g}.a + e_{s_a}, \qquad (6)$$

this last error having a variance of r_{ag}^2.

Furthermore,

$$r_{ag} = (r_{ab}.r_{ac}/r_{bc})^{\frac{1}{2}}{}^8 \qquad (7)$$

where a, b, and c are any three of the performances that satisfy (2), and, therefore (1).

Next let us turn to the case of greater practical importance where a *team* of different performances is available to measure g. From this team there can be constructed a collective score t as follows:

$$t = G/(S^2 + S)^{\frac{1}{2}} \qquad (8)$$

where G denotes the sum for varying u of such terms as $u.r_{ug}/(1-r_{ug}^2)$, u being the score for any single performance. S is a similar sum, but the preceding numerator "$u.r_{ug}$" is here replaced by r_{ug}^2.

If throughout (5) we substitute t for a there ensues with a little simplification :

$$g = G/(1 + S) + i, \tag{9}$$

where i is an error whose variance is $1/(1+S)$. For the specific factor the formula becomes somewhat more complex. We get :

$$s_a = [a - r_{ag}.G/(1+S)]/(1 - r_{ag}^2)^{\frac{1}{2}}, \tag{10}$$

plus an error e_{s_a} whose variance is :

$$r_{ag}^2/(1 - r_{ag}^2)(1 + S).^9 \tag{11}$$

After all these derivations from the bisection of an ability into a general and a specific factor, the vital question arises as to whether this mode of division is exclusive or not. That is to say, does the acceptance of it entail a refusal to dissect the ability in any different way? Most certainly not. For instance, the present writer himself has laid the utmost stress upon a totally different analysis, one whereby each such performance as our " a " is shown to consist of very numerous elementary unit-processes.[10] Expressing this analysis mathematically, we get instead of (1) :

$$a_x = A_1.e_{1x} + A_2.e_{2x} + \ldots + A_n.e_{nx}, \tag{12}$$

where the e's are the elements (*this time* not uncorrelated) and the A's their respective weights in the performance a. Probably—though not certainly—each of these e's has its own charge of both g and s. In other words, the g manifest in (1) consists of the sum of all the g's latent in (12), and similarly as regards the s's.

After all these formulas involving g and s, there is still to be faced the most vital problem as to what these terms really signify. This will be considered later on. At the stage of proceedings so far envisaged, they simply indicate a possible way of dividing up a person's performance, and therefore in some sense or other his ability which this score represents. We have, in fact, remained up to now within the sphere of the *general* theory of two factors. All views as to the particular nature of g and s constitute only *sub-theories*.

II.—Opposition to the theory of two factors.

After thus setting forth the nature of this theory—and, incidentally, noting the kind of evidence upon which it rests—we may be allowed to devote a few words to describing the opposition which it has had to encounter. For this has been of almost unparalleled tenacity and vehemence. So much so that for some readers the controversy seems to have taken on the character of a sport. But possibly such diversion has been bought at the tragic price of holding back the progress of science

for many years. Let us hope, at any rate, that what has managed to survive such long and vigorous onslaughts must, indeed, have its foundations in solid rock.

A large part of the opposition to the theory has arisen merely from misunderstanding it. For example, although the theory had expressly insisted that (2) could only be expected to hold when the performances were dissimilar, and although this limiting clause had at once been enforced with illustrations in all detail, and although the absence of such a clause would make the whole theory absurd, nevertheless some of the most influential writers continued for several years to ignore completely the limitation. However, such gross misunderstanding of the theory is now at last on the wane.

Another and more excusable source of opposition has been in respect of the observed facts. Some experiments have been brought forward which their authors declared to contravene the theory because, although the performances tested were dissimilar, still (2) or (3) was not well fitted. But in reply it has always hitherto been shown, either that these cases really did fit (2) and (3) if only handled in a proper manner, or else that they belonged to just those few where broad group factors had already been demonstrated, so that just here (2) and (3) ought *not* to be fitted. And in no instance, so far as I know, has even the author himself attempted to rebut this counter-criticism.

Anyway, differences of opinion will, no doubt, always remain possible on the exact degree of approximation attained in particular cases, and they should have but little weight on the problem as a whole. To shake the evidence of the innumerable cases where (2) does unquestionably fit within the limits of the experimental error, the objection must not be of a casual but a principial character. And something of this sort was not long ago interestingly suggested by Thorndike, when in 1925 he laid down a definite list of tests that ought to be tried. Now at last these have actually been tried by J. H. Wilson; the results have been found to corroborate our predictions as completely as possible.[11] More usual than any such demand for trying particular tests, however, has been that for getting a larger number of subjects to be tested. Particularly insistent in this respect has been Godfrey Thomson, who exactingly, but not unfairly, demanded evidence that, when the number of subjects is increased progressively from 100, 200, 300 up to 1,000, then the observed tetrad differences decrease correspondingly in accordance with the formula for error of sampling.[12] Even this hard piece of evidence has just now actually been produced—and by Dr. Stephenson, who, himself, was formerly a student under Thomson.[13] In respect of

observation, then, the opposition to the theory would appear to have lost its final standing ground.

Another line of opposition widely adopted has been with reference to our mathematics. These have repeatedly been declared at fault. But now our collective publication of all our main proofs[14] has enabled these to be corroborated in all essential points by several of the foremost mathematicians, both in England and in America, who came to the question entirely without bias. Especial thanks in this respect are due to E. B. Wilson, to Bowley, and to Piaggio. Wilson writes about the work:

> "I have read the proofs with care (including the references to the literature, not all of which has been reproduced in the book), and have found no errors in the mathematics."[15]

Piaggio brings forward an equivalent but much simpler and more luminous expression of my main theorem.[16] Accordingly, on this line also the old opposition may be regarded as defunct.

We now pass on to the objection which seems to have played the largest part of all. It was raised by Thomson when, in 1925, by means of tossing with dice, he actually produced a set of correlations by which (3) was quite well satisfied—and probably (2) would have been so, too—although according to him the variables did not display "a ghost of a general factor."[17] Three years later he brought forward two more sets of correlations about which he said much the same. But this time the correlations were not constructed with any actual variables, whether dice or of any other kind. Instead, he calculated (using a formula given already by myself in 1904)[18] what correlations *would* ensue from using the dice. Such correlations may be called "synthetic" as compared with the natural ones based on actual variables.[19] For all these three sets of correlations the make-up of the scores of the individuals can be represented by our equation (12). But this time the e's are the dice or other uncorrelated elements entering into the total score a_x, whilst the A's have such values that no appreciable amount of e's are general. On the strength of this work he writes an article entitled "The General Factor Fallacy in Psychology," and declares:

> "I find it necessary to insist, with all the emphasis of which my pen is capable, that the deduction of the presence of a General Factor which Professor Spearman has based upon this phenomenon [the criterion (3)] is utterly and entirely invalid."[20]

These three cases, together with the said "emphasis," proved sufficient to gain widespread assent. But in truth all three were failures. The first of them suffered from the fact that the A's were assigned in an entirely arbitrary manner, so that the results got from them could not

claim any generality. The second and third sets were disqualified by a flaw which seems to have curiously escaped detection. Their author writes of them, particularly the third, that "this is a hierarchy as perfect as any ever found in experimental psychology." But in point of fact the sets "found in experimental psychology" for the most part succeed in passing both the criteria of hierarchy, (2) and (3), quite well, whereas his two sets do not even approximately do so. This statement may be at once verified by actually trying the criteria. Instead of using either criterion he seems to have trusted in mere superficial appearance, and so to have been misled by making no allowance for the fact that his correlations were only "synthetic." Correlations of this kind are automatically purified from all errors of sampling, whilst in the natural correlations the sampling errors have, of course, full sway. This is a grave miscomparison that has since occurred many times in the literature on tetrad differences.

But the same author took another step which was much more serious still, since it affects not only his three just mentioned sets of correlations, but all subsequent modifications of these in which the two preceding difficulties may have been overcome. Expressed crudely, it consists in supposing that what has never been put into such functions as the a_x can never come out of them. Such a view, I believe, indicates a fundamental misconception of the essentially plastic nature of mathematics. With material dice, no doubt, the proposition would be true enough. If you never put one and the same die into all your different groups of dice, you can never afterwards get the same die out of them. But with such entities as general factors—and, what is more, with the mental or even physical influences which these factors represent—such a transformation does become possible; of this we shall see a notable instance later on. Anyway, the theorem that when (2) occurs (1) *must* ensue has now behind it an authority which renders further demurs impossible. Such statements as that the dice correlations prove "not a ghost of a general factor" to exist are heard no more.

Of very different stamp is another objection raised by the same author much more recently. This is one that, for my part, I only wish I could afford to leave unnoticed, for it tends to become personal. He has on several occasions characterized "the essential point" of the theory of two factors to be the "absence or unimportance of group factors."[21] To me it seemed that if anyone had ever formed such a notion, at least it would be dissipated by "The Abilities of Man," in which group factors play a very prominent part. On being disappointed in this expectation,

and falling into some, I hope not unpardonable, annoyance about it, I wrote in an article expressly directed to him that our school

> " claim to have originally discovered group factors. Beyond doubt, we have been sedulously investigating them ever since. And we believe ourselves to have actually traced out their presence throughout the whole length and breadth of human ability. Whereas Thomson, to the best of my knowledge, has never investigated—if he has so much as mentioned—the nature of a single one of them ! "[22]

Taking no notice of this whatever—so far as I know, at least—he has only a few days ago made again the same statement, with the added suggestion that my " disciples " have been deserting me on the matter. He writes and reiterates that in my theory :

> " the underlying traits are, one specific trait for each test, usable only in that test, and a general factor usable in all. The few departures from this simplicity are in Spearman's theory (the " Theory of Two Factors ") unimportant, though his disciples may have shown a strong tendency to introduce wide-reaching and important group factors as well."[23]

Now, seeing that the very first of the " wide-reaching " group factors happened to be discovered by myself before any " disciples " existed ;[24] seeing, also, that almost all the subsequent discoverers of group factors have been students avowedly working under my direction ; seeing, too, the tone in which these one and all have referred to their intimate collaboration with myself ; and, finally, seeing how emphatically I, in my turn, have indicated that each of these researches brings " a single stone upon a preconceived unitary plan," so that each " fitted into its place to build up the common edifice ; " in view of all these things I cannot acquit Thomson of gravely misrepresenting me.

In point of fact, the sole notable writer who appears to have introduced many more group factors than I can well accept is Professor Kelley. And even these are by no means the large and important ones, but, on the contrary, so inappreciable that for this very reason I have had to doubt their genuine existence. As regards the larger group factors, Kelley compares his findings with mine, as follows :

> " On the whole, the two sets of findings are quite remarkably in harmony, the agreements being in the matter of a spatial, a numerical, a memory, and even a general factor, though this last is differently interpreted, and also in the conclusion that a large number of specific motor (probably also sensory) factors exist.

There is scarcely a disagreement in the matter of music, purpose, cleverness, and sex, though here the data are inadequate."[25]

As Thomson in his review of Kelley's book conveys the impression that the latter throughout disagrees with me, I am again obliged to call into question the exactitude of his report.

Be this as it may, at any rate, neither my students, nor I myself—nor even Kelley, I think—have ever made any "departure" from the "Two Factors" at all. As eventually extended to the psychology of orexis, our theory has, no doubt, not indeed abandoned its old foundation in these two, but greatly broadened this foundation. It has shown itself capable of development into the "Theory of Factors" in general.[26] But as regards the particular sphere of psychology here at issue, that of abilities, not even this broadening of basis has been as yet required. The theory may still be called that of "two" factors as appropriately as ever. A few words may be allowed in order to demonstrate this.

That the theory held by our school is still fundamentally that of the Two Factors, general and specific, is shown at once by the fact that, whereas these two are absolute and permanent, the other or group factors are only relative and temporary. Any constituent of any specific factor s_a can, for the moment, be converted into a group factor, by the simple means of considering the performance a in comparison with any other performance b which likewise contains this constituent. Conversely, any group factor, however important, can forthwith be converted into a purely specific one, simply by no longer comparing together any two performances that both contain it.

Further, the group factors are, after all, nothing more that sub-divisions of the original specific one. Take, again, the case that performance a does share some group factor with performance b. We may then re-write (1) as follows:

$$a_x = C_a.g_x + (K'_a.s'_{abx} + K''_a.s''_{ax}), \qquad (13)$$

Nothing has happened, obviously, except that the original s_{ax} has been broken up into s'_{abx} and s''_{ax}, where s''_a remains peculiar to the test a, but s'_{ab} is now shared by test b also, and is, therefore, called a group factor. There is nothing to prevent such a breaking up of the original s_{ax} from being carried to any extent; but to the end these sub-divisions will never affect the original and main division, that between this s_{ax} and the g_x.

But enough has been said—if required, much more could be added—to show how characteristically our theory still remains that of "Two Factors." The group factors as conceived by us are no departure from these, but only supply their earliest, most natural, and most inevitable outgrowth.

Let us now turn to some criticism of the theory which is of most opposite kind. It has been gladly welcomed ; for it is courteous, objective, exact, and profound. But in spite or rather because of these things it is far more disturbing. It is that of Professor E. B. Wilson.

Using some mathematics which at first most of us, I think, found unfamiliar, he proved that g consists of two portions, the one "r_o" being, indeed, uniquely determined, but the other "v" *not* being so. To hear that g is not uniquely determined is surely alarming enough. But now, after more consideration of the matter, I venture to ask Professor Wilson whether his bisection of g is, after all, essentially different from that which is shown in our equations (5) and (9). If not, then by increasing the number of performances the indeterminate portion can be made as small as may be desired.[27]

Still more startling appeared to be Wilson's second main theorem. This was that, if liberty be granted to compose new scores by adding or subtracting any desired multiples of the old ones, then these new scores can also be made to fit our (2) and (1) as well as the old ones did, but now the g's can be made of any desired magnitude ! To this theorem my first reaction was to think that such addition and especially subtraction of multiples of scores was, at any rate, psychologically preposterous. But then suddenly I realized that I had long been doing just these very things myself ! For instance, the score for tests of mental inertia or perseveration have usually been of the form $X.x - Y.y$, where x and y are two performance-scores, whilst the capital letters are weights or multiples. My present conclusion is that Wilson's divergent possible values for the g are no more in conflict with one another than, say, equation (1) is with (12). Such values do not occur by chance, but only by means of satisfying more or less elaborate conditions. In each case, then, we have only to inquire whether these conditions are reasonable, and whether the upshot is scientifically serviceable.

On the whole, then, this second discovery of Wilson, far from invalidating the theory of Two Factors, seems likely to lead this on to a wonderful extension.

III.—THE THEORY OF "SAMPLING."

So far, we have been considering all the objections to the theory of Two Factors that in their time have held up progress, but nowadays need no longer be taken seriously. Furthermore, we have seen that the work of E. B. Wilson presents no objection at all, but, rather, an extension of it. There remains, however, yet another objection and one that still

exercises a wide influence. The theory is rejected on the ground of there being a better one to take its place, namely, that of "sampling." To this, then, let us now turn.

First of all, let us earnestly endeavour to conceive it correctly. After all the misrepresentations to which the other theory has been subjected, let us at least try to treat this one better. Where is it authoritatively defined? What is a sample of what? What does a "sample" mean? Above all, seeing that the whole topic is one of applied mathematics, we need a precise statement of what this theory amounts to in mathematical terms; we want, in fact, something comparable with the equation (1) of the other theory.

Now, among the advocates of the sampling, the definition of this theory still most frequently quoted is due to Thomson, and runs as follows:

> "Thomson prefers to think of a number of factors at play in the carrying out of any activity such as a mental test, these factors being a sample of all those which the individual has at his command."[28]

As to the nature of a "sample," all dictionaries appear to define it in much the same way. For instance, the Oxford dictionary represents it as:

> "A relatively small quantity of material, or an individual object, from which the quality of the mass, group, species, etc., which it represents may be inferred."

Turning to the mathematical expression—which alone, as said, brings the theory within the scope of our problem—this seems to have always taken the form of our equation (12), but with the added condition that the A's *and the* e's *are picked independently from all the values possible to all the tests at issue and to the whole population subject to test.* And this condition seems reasonable enough; indeed, indispensable. For, as recognized universally, the very first requisite in order that the quality of the "mass" should be inferred from the "relatively small quantity" constituting the sample is that the items in the latter should all be independent of one another. In default of this independence the small quantity is no genuine sample at all.

It is this equation (12), then, together with the added condition of randomness or independence that has really been invoked in all the efforts to demonstrate that the theory of sampling explains the observed satisfaction (at any rate, approximate) of the criteria (2) and (3).

Now a most curious feature about the demonstration of this theory of sampling has been its history. First of all, apparently, the theory was mooted by myself; but only to be rejected by me, because found *not*

compatible with (3) or (2).[29] Soon afterwards it received from Thomson just the opposite reception; for he cordially adopted it; he reported that his synthetic correlations satisfied (3) very well indeed.[30] Next, it was examined by Garnett, who showed that it satisfied (2), but nevertheless rejected it, as proffering a less simple explanation of this criterion than the Two Factors did.[31] Then Thomson advanced some more sets of correlations, this time not synthetic, but based upon actual dice-throws. These, he said, and probably with truth, satisfy both (3) and (2).[32] Then I gave a new proof that the theory failed to satisfy (3).[33] Finally, came Mackie, who—working, it seems, in sympathetic communication with Thomson—demonstrated that the theory does satisfy (2), but arrives at the strange conclusion that every correlation tends to equal $2/\pi$, a result which is, of course, totally alien to all actual observation.[34]

In this historical record we may first notice that no one has even attempted to prove—as had been done in the case of the theory of Two Factors—that when the criterion is satisfied, then the division of the test-score is possible. Only the much easier attempt has been made at the converse and far less important theorem, that when the division can be made then the criterion will be satisfied. But over and above this grave limitation, all the research has evidently led to extraordinary divergencies of result. Nor need this be essentially attributed to errors of mathematics. The only case obviously affected in this way would appear to have been the synthetic correlations of Thomson (see p. 146).

Why, then, we may ask, has no such discrepancy ever befallen the theory of Two Factors? As regards this, whenever the mathematics have been correct, perfectly concordant conclusions have been attained.

The reason would seem to be as follows: The theory of Two Factors as expressed in (1), together with its condition given below (1) in italics, is perfectly definite; hence, all deductions about it, such as its rigorous interdependence with (2), must necessarily be the same for all correct reasoners. But, on the other hand, the sampling theory, as expressed in (12), together with the condition given in italics on page 150), fails to be definite; and, as a natural consequence, successive investigators of it have really been treating different conditions, and so have arrived at different conclusions.

The indefiniteness has lain in two directions. Of these, the first is in respect of how far the principle of random sampling shall be taken to extend. *Some* degree of random sampling enters into all theories of ability, and, indeed, into all statistics whatever. Now at the beginning of the business I myself had taken the randomness to be *complete*; the

relative values of the e's were assumed to be as if obtained by drawings out of a bag which held all values possible, and as much was assumed by me about the A's. Thomson, coming after me, greatly modified this simple procedure; his manipulation of the dice brought in tacitly several drastic limitations to the scope of the randomness; for instance, out of his 145 e's, no less than 109 were not allowed to fall randomly among all the performances, but, instead, were each of them *a priori* restricted to one performance alone; and among the further limitations which he introduced some seemed to me quite irrational.[35] Garnett, for his part, returned to complete randomness again, but differed from me in that he took absolute instead of relative values. Mackie, in spite of working in consultation with Thomson, followed mainly Garnett.

The second source of indefiniteness in the theory of sampling is the number of the elements; that is to say, the value of the n in (12). Thomson —as mentioned—took for his first set of correlations only thirty-six elements that varied randomly. In his second set he again took thirty-six. In his third only thirteen. Yet he speaks of these elements or e's as possibly representing neurones, in which case their number would, of course, be almost infinite.[36]

One would like to think that all this discrepancy of conception is, at any rate, confined to matters that can be temporarily relegated to "sub-theories," leaving at least some common core that serves as the *general* theory of sampling. But even this hope appears to be vain. The different conceptions of what constitutes random sampling have, as just seen, changed the relations to the criteria entirely. And when we take further into account the different ratings of the size of n, the discrepancies pass all bounds. For instance, a large n does in general satisfy (2), but it completely fails at (3); also, it does not at all agree with the large variance often observed in the correlations; similarly, it is in conflict with the large variance to be observed in g. On the other hand, a small n agrees with the large variances, but breaks down in almost all other respects.

There has still to be noticed the matter of group factors. Thomson seems as anxious to claim these for his own theory as to deny them to the other one. He writes that, whatever else the sampling theory denies or asserts, "it does deny the absence of Group Factors."[37] Up to a certain point this is correct enough. His theory with its randomness does make almost all the factors group ones. But he omits to take into account that if n be large—as it must be, to satisfy (2)—then each of these factors becomes individually so small that it is completely incapable of isolation; hence, it cannot possibly be detected, much less investigated. In a word,

he does indeed offer us plenty of group factors ; but only such as remain outside the pale of science. For this reason it is that I had to suggest before (p. 147) that Thomson and his whole school had never investigated or even mentioned the nature of a single one.

All in all, our examination of the theory of sampling has resulted unfavourably. Of course, nobody doubts, or ever has doubted, but that the mental processes at play in doing any mental test constitute a *selection* out of all the processes which the tester has at his command. This much is sheer logic. But the present claim that the manner of selecting has, under the name of the sampling theory, been so formulated as to explain the precise quantitative observations of (2), (3), the variances, and so forth, not to mention such elaborate developments as (4)—(11)—this claim would seem to be quite inacceptable. Possibly, indeed, some such formulation may some day be achieved. But the semblance of having done this already can only be attributed to extreme equivocation. Consider, for example, how the advocates of the theory treat the size of n. They assume this to be small, when they desire the credit of accounting for appreciable group factors ; then they make it large again, when they have to satisfy the observation of (2) ; but then small once more, upon being faced by the observed variances. In truth, there does not exist any *the* sampling theory, but only an indefinite number of sampling theories each requiring discussion separately.

IV.—Compatibility of the two theories.

Let us, however, for the moment suppose that the said happy event has arrived, and that some conditions of random sampling have been conceived that, besides being otherwise acceptable, do perfectly agree with (2). How would this success of the sampling theory affect that of Two Factors?

Originally, as we saw, the precipitate conclusion had been drawn that the latter theory must thereby be disproved and that " not a ghost of a general factor " could exist. But then Garnett demonstrated that in the successful cases the general factor was really present all the time, though hidden from view.[38] For my part, I have always urged more generally that each theory must stand or fall on its own merits ; given (2), then the validity of (1) together with its italicized condition is rigorously proved ; hence if anything else, such as (12) with the condition of randomness, should happen to be proved also, then the two equations with their respective conditions *must* be compatible with one another and merely depict different aspects of one and the same reality.[39] Much the same

has been cogently urged in the works of Dodd.[40] But the latest and most brilliant demonstration has been supplied by Piaggio.[41] He writes:

"An interesting example, in which at first sight there appears to be no general factor, is the following:

$$a=\tfrac{1}{2}\ (\quad v+w+t+p),$$
$$b=\tfrac{1}{2}\ (u\quad +w+t+q),$$
$$c=\tfrac{1}{2}\ (u+v\quad +t+r),$$
$$d=\tfrac{1}{2}\ (u+v+w\quad +s),$$

where each variable on the right-hand side represents the score (reduced to standard measure) of a die. We find $r_{ab}=r_{ac}=\ldots=\tfrac{1}{2}$, and so each $\mu=\sqrt{2}$. This gives:

$$g=\frac{1}{5\sqrt{2}}[3(u+v+w+t)+(p+q+r+s)+i\sqrt{10}]$$

and $$s=\frac{1}{5\sqrt{2}}[-3u+2(v+w+t)+4p-(q+r+s)-i\sqrt{10}],$$

so we have resolved the overlapping group factors into the general factor which seemed to be lacking."[28] In fact, adopting appropriate units and weights we may say that g is here only the sum of all the elements; or equally well, that the elements are only little bits of the entire g. Between these two aspects there is obviously no conflict whatever. Throughout cognition, we sometimes regard objects as wholes and the next moment consider their constituents separately. My own favoured interpretation of g has been as measuring some general energy. And this "energy," in view of the experimental results about the influence of speed (*Abilities of Man*, ch. XIV), I should now like to replace by the cognate concept of "power" (energy divided by time); physiologically, I take such power to be probably derived from the "gradient" of Lashley and Child. On the other hand, the advocates of the sampling theory have often inclined to regard the e's as so many hereditary units or genes. If ever each of these two interpretations can be rendered plausible in itself, then nothing remains to prevent them from being combined together. For what could be more natural than to conceive the genes not indeed as bits of the energy or power, but still as all determining its magnitude. It would thus appear that the theory of sampling, whenever it is so conceived as to satisfy (2) exactly, cannot possibly conflict with the theory of Two Factors; it can only invest the terms of this with more or less interpretation. It, therefore, really and truly constitutes only a "sub-theory" of that of Two Factors.[42]

Let us now, however, pass over to another conception of the sampling in which (as by making n small) the satisfaction of (2) is *not* exact. Does

it in this case clash with the theory of Two Factors, which, as we have seen, insists on satisfying (2) exactly? To a certain extent we must here answer "Yes." The theory of Two Factors would at any rate be obliged to produce some plausible explanation of the non-satisfaction of (2) (such as a definite nameable and investigatable group factor). Whereas the sampling theory would be free from any such obligation, it would have the privilege—not, perhaps, an enviable one—of merely attributing the non-satisfaction to "chance." Actually, however, no such emergency has arisen. Experimental work, especially the recent research of Stephenson, shows that under suitable conditions there is no evidence of any departure whatever from the equation (2). Hence, even this possibility of conflict between the two theories has now disappeared.

But there still remains a subtler and, therefore, more dangerous kind of opposition possible. It is the view that, if only the sampling theory can be brought into line with the observed facts, then its advocates can claim to be no longer "compelled to accept" the other;[43] they no longer "need" it;[31] they are at liberty to "prefer" their own. Here lies, it seems to me, the present crux of the situation. I venture to demur at the preceding claim and to suggest that possibly in some sense or other every reasonable person *is* compelled to accept the theory of Two Factors.

Even so far as the purely mathematical part of the theory is concerned—for instance, that (2) leads rigorously to (1)—this can fairly demand acceptance to the extent of frank acknowledgment of its ideal truth. And when (2) has been shown to derive from actual observation and, therefore, to represent an aspect of real existence, then both these properties must be accepted as regards (1) also. Indeed, this is the universal course of science. Suppose, for example, that a circle is actually observed to have its radius equal to x. Then, not only is this size of radius a property of the really existent circle, but so too must then be having, say, a diameter equal to $2x$.

Nevertheless, even thus granting that every magnitude that is derived from actual observation does refer to real existence, we may still question whether it possesses any scientific significance. One could easily enough invent innumerable further ways of dividing up any total score such as a_x into factors—ways that would also be strictly valid—and yet they might be sheer trivialities. We should have to assent to them as truths, but we could afford to pay no attention to them. On the other hand, supposing that any way of division, instead of being a triviality, did lead to scientific information, then it seems to me that every one really is bound to give to these the notice they deserve.

Here, then, lies the final decision as to whether any one is "compelled to accept" the theory of Two Factors. It has nothing to do with his acceptance of any other theories that do not conflict with this one. It depends solely on whether or not this theory in itself is not only true but scientifically serviceable.

V.—Scientific values of the theories.

In the case of the theory of Two Factors—to take this first—we claim that such information has already been accumulated in fullness. And the great reason why this has been possible lies in the fact that equation (1) presents four terms which admit of precise measurement under all variations of conditions.

In this way, for instance, evidence has been brought that the weight of g in a test depends wholly upon the degree that the ability involved is "noegenetic."[44] That is to say, the coefficient c_a in (1) becomes large (at the expense of k_a) according as the critical part of test a involves the educing of a relation or a correlate. And this occurs, it would appear, with all the nine classes of relation impartially. This discovery in its turn throws light upon the "general intelligence" as conceived upon any basis independent of that of noegenesis. *For all such different concepts are now proved to be wrong.* Did any such thing exist in the abilities tested, then there would be *two* independent general factors; and this, when (2) is satisfied, cannot possibly happen. From these and cognate arguments we can readily see that only g is able to supply a stable anchorage for all the current tests of "mental age" or of "I.Q." Indeed, it appears historically to have actually furnished these tests with their original inspiration.[45] Anyhow, whatever we may think about the consequences of c_a depending on the presence of eduction, the actual fact of such dependence has been supported by a great mass of evidence (in *The Abilities of Man*); and, so far as I know, has been definitely opposed by none. No one, then, can fairly refuse to take cognizance of this evidenced fact just because he wants—for good reason or bad—to express the test scores in factors of some different pattern, which perhaps may also be possible. For him to do so would be like denying that the sun rises in the east just because he himself likes looking to the west.

About the s's, also, an array of observations has been secured. The weights of these specific factors have been found to depend on the degree that the performances involve the influence of the sensory organs, of the motor organs, or of retentivity. Furthermore, they may be swollen

to any extent by " accidents," such as particular previous experiences of the individual tested or irregularities in the procedure of testing.

Over and above all such information obtained directly concerning the four terms entering into (1), there is much to be had from observation of functions of these. Here belong especially the discoveries made about factors so " broad " as to be likely to engender extensive group factors. The most striking feature about these has been their rarity. Time after time, where psychologists had been confidently assuming much functional kinship, the method of the Two Factor theory has shown that none really exists. In a few cases, however, broad factors did make their appearance. The chief instances, so far, have been the cases of logical, psychological, verbal, arithmetical, mechanical, and imaginative ability. Far broader still, but no longer simply abilities—rather, ratios between these—have been the cardinal factors named by us o and p (the latter being sometimes also written as c).

As further discoveries about all these factors, general, specific, and group, may here be cited their connection with all the *quantitative* laws of cognition; those of span, of retentivity, of fatigue, and of conation (including such things as " interest "); also, all purely physiological influences.

Yet further, from all this systematic examination of the sphere of cognition, a passage has been found over to the other great sphere of the mind, that of volition, emotion, and character. Here, too, a general factor, w, has been found, which is nearly or quite independent of g, and perhaps has greater importance still.

Lastly, to all these observations of fact there has been added the speculative hypothesis that the g represents some general " energy " or " power." But at the present day, luminous as I still believe this hypothesis really to be, I must doubt whether its introduction did not harm the development of the theory of Two Factors. For amidst the heated but necessarily indecisive controversy that has ensued about this hypothesis, attention has been side-tracked away from the immense amount of positive research which this theory has accomplished, and which retains its value quite irrespective of its hypothetical interpretation.

After thus reviewing all this information acquired by means of the theory of Two Factors, what corresponding claims can we make on behalf of the rival theory, that of Sampling? On looking at its formulation in (12), we see that this, in contrast with the other one given in (1), presents no term at all which admits of systematic variation and exploration, since all the e's, as also all the A's, are by very definition of the theory determined through the blind agency of random chance.

Lacking thus any terms precise enough to admit of being investigated, the advocates of the sampling theory have been obliged to have recourse to the general fact that this theory introduces a great multiplicity of elementary factors all contributing to the total score in a test. The most prominent instance of their utilizing this multiplicity is when they suggest that the improvement obtained by practising a performance is due "not to improvement in the elemental abilities which form the sample, but to a weeding out and selection of these." Now, with this general analysis of improvement we may, to a large extent, agree. But if we are to use it for such a serious matter as the scientific justification of the sampling theory, we surely must ask from it a little more precision; we must especially inquire what particular entities or characters the elements are in this theory supposed to represent. Such particularization, though not needed when we were only laying the mathematical foundation of the theory, becomes imperative at present when we are seeking to build up a factual super-structure. Unfortunately, in place of the desired unequivocal indication, the elements have in their time to play many parts. Here they are taken to be "elementary abilities," so that if we are not punctilious about words, the "weeding out" may be allowed to pass. But more often the elements are taken to be neurones or genes; and then the weeding out becomes a very strange operation.

But waiving this trouble about the equivocality in the nature of the elements said to be sampled, a still greater difficulty arises when we inquire how any "sampling" comes into play at all. Take, for example, the following most recent and most formal enouncement of the application of the theory as conceived by Thomson. He writes:

> "My own view is that the mind is one extremely complex organism which, at the time when it comes to attempt any of the tests used in the production of these tables of correlations, draws its ability to succeed in any one of them from a multitude of sources, some inherited genes for this or for that, some points of training or of experience during education and during life."[46]

In itself this view is irreproachable. Indeed, this or something like it has long been agreed upon by everybody. The real problem is not as to whether some such situation of multiple elements exists or not, but as to how it can best be harmonized with another known situation, namely, the observed satisfaction of (2), which by virtue of the theory of Two Factors inevitably leads on to (1). Such a harmonizing is the business undertaken by the sub-theories of Two Factors. One attempt —hypothetical indeed, but fitting admirably with an immense number of known facts and contradicted by none of these—is to regard the genes

as dominantly responsible for producing a general factor of power, whereas the " points of training or of experience " are taken to be the main contributors to the specific factor.

Now the sampling can do no more than supply another sub-theory or attempt at explaining how the known situation can be brought into relation with (2) and, therefore, (1). In what fashion does it manage this? It must necessarily, of course, base itself upon the essential nature of the theory, as this has been actually employed and as already described. We have seen that, amidst its surprising diversities in other respects, the one thing inevitable about this theory has always consisted in the double condition of randomness or independence; each element should fall to the lot of each test independently, and the value of each element with each individual should be taken independently from all the values possible to the whole population. Now, are these theorems here realized? We may easily enough concede that a person's genes are originally—that is to say, before being modified by somatic influences—selected at random or independently from among those of his parents. But never can we admit that these values are selected independently from all those possible to the whole population. To assert as much would be to deny heredity altogether. Again, how can we rationally suppose that in every test each point of previous training or of experience comes into action independently of every other one? By all odds more probable is that the several points called into action by one and the same test have many and intimate connections with each other.

But if, to save the case, the alleged independence of the elements be dropped, then the theory can no longer be one of " sampling " at all. And, what is much worse, the sole mathematical foundation so far provided for it crumbles away, with no prospect offered of another foundation in place.

Thus in our final matter for consideration, that of scientific value, the sampling theory has showed itself more unfortunate than ever. Far from contributing—as the other theory has proved itself to do—an immense amount of positive information—it does not even present a zero balance sheet. For once it has been fundamentally definite—and then definitely wrong. Not on any conflict with the theory of Two Factors has it come to wreck. This theory has but supplied to it its field of possible application. The rocks that have sunk it are its equivocality in itself and its disagreement with the facts admitted universally.

FOOTNOTES.

[1] " General Intelligence " Objectively Determined and Measured.—*Am. J. Psychol.*, XV, 1904.

[2] *The Abilities of Man*, 1927, p. xi, equation (17).

[3] Ibid., pp. iii-vi.

[4] Ibid., p. iv. The original description of this, as also the compensation for the sampling errors, are given in *Brit. J. Psychol.*, 1912, V, pp. 56 and 82.

[5] *Am. J. Psychol.*, XV.

[6] *Zeit. f. Psychol.*, XLIV, pp. 50 ff.

[7] *Abilities of Man*, pp. xxii-xxiii.

[8] Ibid., p. xvi.

[9] All these formulas and their proofs can be got from the appendix to *The Abilities of Man*. (8) is given in (31), page xx, but there the "Z" is an error of transcription for "S." In order to ubstitute t for a in (5), we further require r_{tg} which is given in (3), page xix, except that there the minus sign is a misprint for the plus sign. As for the variance of "G," this is given in the eighth line on page xx, except that there again the "Z" must be replaced by "S." With their aid, there can at once be seen our present (9), (10), and (11).

[10] See *The Nature of Intelligence and Principles of Cognition*, by present author, 1922, page 58.

[11] *J. Educ. Psych.*, 1924, 1925, 1931.

[12] *Brit. J. Psychol.*, XVII, 1927, p. 241.

[13] *J. Educ. Psych.*, 1931.

[14] *The Abilities of Man*, appendix.

[15] *Science*, March 2nd, 1928.

[16] *Nature*, January 10th, 1931.

[17] *J. Brit. J. Psychol.*, VIII, 1916.

[18] *Am. J. Psychol.*, XV, 1904, p. 75. Also much more elaborately in Correlations of Sums or Differences, *Brit. J. Psychol.*, V, 1903, p. 417 ff.

[19] *Brit. J. Psychol.*, IX, 1919, p. 337 ff.

[20] *Brit. J. Psychol.*, 1920.

[21] *Brit. J. Psychol.*, XVII, 1927, p. 235.

[22] Ibid., p. 322.

[23] *Forum of Education*, 1930.

[24] *Zeit. f. Psychol.*, XLIV, pp. 50 ff.

[25] *Crossroads in the Mind of Man*, 1928, p. 23.

[26] *See* 'G' and After—a School to End Schools, in *Psychologies of 1930*, ed. Murchison.

[27] *An indication.*—Since we have $g=r_o+v=G/(1+S)+i$, we may perhaps be able to equate the determinate and the inderterminate parts of g respectively, and say $r_o=G/(1-S)$ and $v=i$.

A Proof.—The v is defined as being "any vector in the space of n-k-l dimensions orthogonal to the g space and to the equally inclined vector u." Whereas the i was defined as any variable that is uncorrelated with any of the k specific factors or with g. I suggest that these two definitions mean substantially the same thing.

Corollary.—If either of the preceding proofs is valid, and in view of the fact that i tends to become infinitely small as the number of tests becomes infinitely large, then under this condition g becomes equal to r_o and therefore perfectly determinate.

Another Proof.—By (30) in *The Abilities of Man*, p. 19, $r_{tg}=S^2/(1+S)^{\frac{1}{2}}$. Hence, when the number of the tests becomes infinite, the right of the preceding equation becomes unity. Then, since t is always determinate, g must in this case become so, too.

[28] *Essentials of Mental Measurement*, by Brown and Thomson, 1921, p. 188. Thomson's introduction of his own name alone in the passage indicates that his co-author in other respects wishes to dissociate himself from the sampling theory. This is particularly interesting because at one time Brown was, on the contrary, the chief opponent of the theory of "Two Factors."

[29] *Psych. Rev.*, 1914, XXI, p. 109. *Also Brit. J. Psychol.*, XVIII, 1928, p. 260.

[30] *Brit. J. Psychol.*, 1919, IX.

[31] The mathematical works of this author have been fundamental. The chief ones for our present purposes have been *Brit. J. Psychol.*, IX, 1919; *Proc. Roy. Soc.*, 1919; and *Brain*, 1921.

[32] *Brit. J. Psychol.*, XVII, 1927.

[33] *Brit. J. Psychol.*, XVIII, 1928, pp. 260-1.

[34] *Proc. Roy. Soc.*, Edinburgh, 1928-9.

[35] *Brit. J. Psychol.*, XVIII, 1928.
[36] *Brit. J. Psychol.*, XVIII, 1927, p. 26.
[37] *Essentials of Mental Measurement*, by W. Brown and Thomson, 1921, p. 189.
[38] *Brit. J. Psychol.*, X, 1920.
[39] *Psych. Rev.*, XXVII, 1920, p. 169.
[40] *Psych. Rev.*, XXXV, 1928, and subsequently.
[41] *Nature*, January, 1931.
[42] *Psych. Rev.*, XXVII, 1920.
[43] *Proc. Roy. Soc.*, Edinburgh, 1928-9.
[44] For all these scientific values of the theory of Two Factors, see *The Abilities of Man*, 1927.
[45] See *The Abilities of Man*, chap. V.
[46] *Forum of Education*, VIII, 1930, p. 215.

RÉSUMÉ.

LA THÉORIE DES " DEUX FACTEURS," ET CELLE DE L'ÉCHANTILLONAGE.

On indique d'abord les caractéristiques essentielles de la Théorie Générale des Deux Facteurs (un facteur général et un facteur spécifique) impliqués dans toute activité mentale, en y ajoutant les principales formules mathématiques indispensables à l'application pratique de la théorie. Alors suit une esquisse de l'opposition que la théorie a dû subir pendant un quart de siècle.

Ensuite on décrit les caractéristiques essentielles de la " Théorie de l'échantillonage (sampling) avancée par certains psychologues pour remplacer l'autre. Une comparaison entre les deux révèle qu'elles ne sont point incompatibles ; chacune doit se maintenir, ou tomber, par ses propres mérites ; c'est à dire par son manque d'équivoque, ses rapports étroits avec l'observation directe, et sa puissance féconda-trice pour la science.

Sur tous les trois points la Théorie des Deux Facteurs se maintient, tandisque la Théorie de l'Échantillonage tombe sur tous trois, surtout sur le premier et le dernier.

ÜBERSICHT.

THEORIE DER „ ZWEI FAKTOREN " UND DIE DES MUSTERNS (SAMPLING).

Erstens wird das Wesentliche der Allgemeinen Theorie der Zwei Faktoren (eines allgemeinen und eines spezifischen, die in allen geistigen Beschäftigungen bestehen,) auseinandergesetzt. Mit eingeschlossen sind die hauptsächlichen zur praktischen Anwendung der Theorie gehörigen mathematischen Formeln. Dann folgt ein Umriss des Widerstandes, den diese Theorie seit einem Vierteljahrhundert durchmachen muss. Nächstens wird das Wesentliche der „ Stichprobetheorie " oder „ Theorie des Musterns " (Sampling) geschildert, durch die einige Verfasser die andere haben ersetzen wollen. Ein Vergleich der beiden zeigt, dass sie mit einander keineswegs unverträglich sind ; jede muss schlechterdings von ihrem eignen Verdienst abhangen, d.h., von ihrer Unzweideutigkeit, ihrer Übereinstimmung mit wirklicher Beobachtung und ihrer Ergiebigkeit für die Wissenschaft. In allen drei Hinsichten ist die Theorie der Zwei Faktoren ganz hinlänglich, während die Theorie des Musterns in allen Fällen, besonders im ersten und im dritten erfolglos bleibt

SOME CASE STUDIES OF DELINQUENT GIRLS DESCRIBED AS LEADERS.

*(From a social investigation made in the County of Los Angeles, California)**

By S. CLEMENT BROWN.

I.—*Statement of problem.*
II.—*Method of selection and study.*
III.—*Analysis of problem.*
IV.—*The findings*
(*a*) *Significance of gossip and reputation.*
(*b*) *Personality of delinquent girls described as "leaders."* (*Group A.*)
(*c*) *Family relationships of delinquents* (*Group A*) *and non-delinquents* (*Group B*).
(*d*) *Girls described as "followers"* (*Group C*).
V.—*Interpretation: leader-led relationship.*

I.—Statement of problem.

Those who are concerned with delinquents are aware of extreme contrasts in the capacity of individuals to enter into pleasurable relationships with other individuals, or to take part in group actions. Recent tendencies to substitute personal relationships of a reconstructive kind for repressive group discipline make it desirable that we should understand more about the individual and social determinants of what is called leadership.

A great deal of stress has with apparent justification been laid upon the significance of family relationships in conditioning the social adjustment of the individual. Between existing analyses of the family group, and notable studies of gang formation and crowd psychology, there seems a gap which can only be met by broadening our case studies so as to include the child's range and quality of friendships.

On the topic of leadership itself there are many brief references in general works on sociology, and in more specific studies of delinquency.†

*The material for this investigation was made available in 1925-6 by the sanction of Miriam Van Waters, Ph.D. (Referee of the Los Angeles Juvenile Court), and was carried out in constant consultation with her and with her colleagues, psychologists, social workers, psychiatrists, and teachers associated with the Court, and with El Retiro School, San Fernando.

The paper is an abridgment of a thesis approved for the degree of M.A. in the Sociological Department of the University of Southern California.

†For selected references see Bibliography.

There is also a great deal of popular discussion in which it is generally assumed that leadership is a clearly defined concept, and often that it has an ethical implication. In a preliminary summary that was made of the essays of seventy-five boys and girls, aged between fifteen and eighteen, all the writers except seven assumed that to be a leader involved moral superiority : an assumption that was possibly based upon teaching rather than observation.

II.—METHOD OF SELECTION AND STUDY.

The comments which gave rise to this study were made originally in reference to girls of adolescent age* brought before the Juvenile Court of Los Angeles. From time to time unusually strong statements of blame for " bad influence " made against girls by those involved in the Petition† were confirmed by others who had apparently no direct interest in the outcome of the Court procedure.

For instance:

I.—*Peggy* (aged 15). *Basis of petition* : Stole money and ran away from home. Hired a car. Drove with Flora (15) to Arizona. Flora's mother states that Peggy forced her to go : " Pulled her into the machine with no hat on and only twenty-five cents in her pocket. . . . Flora is in no way to blame. She has always been kept at home as a little child and has never been permitted to go about alone. She is not a forward child."

Head Master of school which she left at 12 states : " She ought to have been in the penitentiary five years ago . . . she was always a disturber and can do anything she wants with the others. The boys follow her as much as the girls."

Sylvia (15). *Basis of petition* : Beyond parents' control. Has had sexual relations. Two friends (15 and 17) blamed her for suggesting that they should go out with boys. One explains : " Sylvia told me how she used to slip out nights and sneak away from her mother, and I thought at once that I could do the same. I thought that it would be smart to get out."

Evidence of unusual influence at two schools and in the neighbourhood. Class teacher said : " Immediately she came into the room she caused a stir."

If the Court statements were taken at their face value it appeared as though there were some individuals who were increasing the delinquency rate of the county. Not only contemporaries, but parents and teachers seemed helpless when faced with certain personalities round whom other people's activities appeared to be focussed and their thresholds of inhibition lowered.

*Ages ranged from 15-17.

†In California the Juvenile Court is one of civil jurisdiction, all persons up to the age of 21 being held incapable of criminal responsibility. They cannot, therefore, be charged, but are subjects of petition and may be made Wards of the Court. No evidence considered relevant from the point of view of the welfare of the child need be excluded, and a verbatim report of testimony is taken.

From a preliminary survey of twelve cases, six so-called leaders* were selected for intensive study. The final criterion of selection was relative consistency of evidence as to their influence. Case studies which were made included the girl blamed (Group A), and also her social constellation. Descriptions of, and comments about, the "leader" collected from about twenty associates in varied relationship formed a sub-section of the study. A second group of non-delinquent girls described as leaders in a mixed high school of 2,000 children (aged fourteen to eighteen) was used for comparative purposes (Group B). Case material was also accumulated upon fifteen of those who were described as having been influenced by members of Group A, and who themselves maintained that this was so (Group C)†

III.—Analysis of problem.

At the outset there were presented four main questions:

(*a*) *What are the bases of reputation and blame?* Individuals had been described as having certain common attributes. Were they in fact distinguishable as a group from other individuals? It seemed possible that the common denotation was in itself a fallacy. It might in fact represent a community rationalization for what was, so to speak, a functional disorder in the social organism.‡ Hobhouse has reminded us that "in considerable measure wrong doing is still conceived rather magically than ethically.§ Had we here an example of primitive social symbolism in which the guilt of the community was projected on to a scapegoat which must be isolated and driven away?

*At this stage there could be no definition of leadership used for selection of cases that did not beg the question at issue. The word is used for convenience as a descriptive term for recurring social situations popularly denoted by words such as "influence," "personal attraction," "magnetism," etc.

†Data available on Groups A, B, and C.: Records from Court procedure, Education Authorities, Social Agencies. Medical Report on physical condition, Results of Psycho-metric examination (Terman revision of Binet-Simon Scale, given and interpreted by Caroline S. Fisher, Ph.D., Psychologist to the Juvenile Court). Interviews with the girls and with relatives in which informal conversational method was used. The most valuable social material was, however, obtained from the observation and recording of social situations as they arose in a boarding school run upon exceptionally democratic lines, where the writer was constantly associating with most of the members of Groups A and C (in a non-regulative capacity) for a period of about eighteen months.

‡For discussion of the analogy of pathological organisms in relation to sociology see Rivers, W. H.: *Psychology and Politics*, 1923: The Concept of the Morbid in Sociology, pp. 57-80.

§Hobhouse, L. T.: *Morals in Evolution*, 1915, p. 423.

For fictional illustration see also Reymont, Louis: *The Peasants*, 1925, Vol. IV, pp. 380-383, where the villagers of Lipka drive Yagna, the offender, from the community on a dung cart.

(*b*) *What kind of personality is in fact selected?* Even supposing that this type of projection accounted wholly for expressed opinions about the delinquent leader, what kind of individual was chosen to carry the guilt?

(*c*) *Is there anything in the individual's social circumstances to account for this selection?* How did these circumstances differ from the non-delinquent girl, also selected as a leader, but with approval rather than blame?

(*d*) *Are there any common characteristics in those described as having been led?*

It is evident that the scope of these questions leads far beyond the boundaries of any small group of case studies. In any of the descriptions and summaries which follow it should be remembered that they are never regarded as carrying more than illustrative significance. Their possible value lies not in reaching any positive conclusions, but in indicating the complexity of the problem; in the suggestion of hypotheses; and in the challenging of generalizations where facts are selected to meet a theory.

IV.—THE FINDINGS.

(*a*) *Relation of Reputation to fact.*

There appeared in every case to be enough of a scaffolding of fact, judging by consistency of evidence, to convince us that the situation represented more than a mere excuse for the shifting of responsibility. Detailed accounts on hearsay evidence were, however, of sufficient variety to allow for a very high degree of misstatement. We had clear illustrations of the effect that this kind of social infection had upon cumulative reputation, and thus upon isolation and prestige.

There were two main types of attitude shown by adult neighbours. Either facts were exaggerated, and the girl was reported as a dangerous influence which must be removed, or else she was accepted, and her immaturity exploited on a social or commercial basis. Both these attitudes are illustrated in the following cases.

Joan (14). *Basis of petition*: Association with a party of drunken sailors, arrested at night on a charge of "disturbing the peace." *Blamed* for causing truancy from school and misbehaviour within the school community (smoking, circulating "nasty" stories, etc.). Accused by neighbours of rowdy behaviour with boys and bad influence upon contemporaries. Was champion fast swimmer, and youngest member of the swimming team of a well-known club. The club was a commercial one, owning the "amusement rights" of that part of the coast. Previous attempts to get her, as a neglected child, under suitable guardianship, were interfered with, on threat of publicity, by members of the club, who protested that they could not afford to lose her as a member of their team. Swimming coach expressed himself as sorry for

her because she had no proper supervision at home. Was, however, convinced from hearsay that Joan had solicited boys and had promiscuous sex relationships. At the instance of the writer took considerable pains to verify his statements and came to the conclusion that talk was responsible for exaggerated accounts of flirtations. This change of opinion justified by medical and other evidence.

The school attributed Julia's (16) sudden failure of interest at school to Joan. Julia's father stated: "Joan didn't have any special friends. She went with everyone. Everyone knew her. She could swim and dive, and she knew it. She would pose on the diving board to attract attention. She was not tough particularly, but she was blasé. . . . I told Julia that I couldn't allow her to go with Joan. *Then I heard a man make a remark on the pier, and I knew she wasn't the sort of girl I wanted Julia to go with.*"

Sylvia (15).* *Basis of Court petition*: Beyond parents' control. Had sexual relations. *Blamed* by girl friends (15 and 17) for suggesting that they join mixed parties without parents' consent; by boy (17) for procuring him for a girl; by adult neighbours for generally harmful influence on contemporaries.

Record apparently quite satisfactory until age of 14, when she left elementary school. Was doing "brilliant work" and taking part in school social activities with success and approval. Failure in secondary school; truancy frequent; work desultory. Attributed mainly to newspaper publicity on occasion of police raid for liquor at eating-house referred to above. Owner of the restaurant declared, in published interview, that he only "acted as a big brother to the kids," that "some of the kids, like Sylvia, were not treated right at home," and that he "just kind of acted as advisory counsel in their troubles with their families." Elsewhere, he confided, for unofficial purposes, that Sylvia was so pretty she was a "drawing card for his customers."

Sylvia's mother, in a letter to the paper, declared that her daughter had not taken part in the "kicking contests" reported in the paper.

The incident aroused much neighbourhood discussion. One neighbour reported that she had supplied contraceptives to boys at the restaurant; another that she had danced naked.

Sarah (15), describing her introduction to the neighbourhood, said: "Everyone was talking about her." She herself was asked by two strange boys to go out with them. They said that Mrs. X had been told by "The Walking Newspaper" (the local name for Sylvia's mother) that Sylvia's crowd went out with boys. It was apparently in this kind of way that Sylvia's "influence" was spread.

It would be interesting and relevant to explore this matter of neighbourhood opinion still further. One would like to know, for instance, how far the conversation between the adults was supplying a satisfaction based upon vicarious experience. There seems evidence of this demand in the bulk of publicity given to crime of a more sensational character compared with ordinary social behaviour. Withdrawal or rejection as an alternative to exploitation, rather than an attempt at understanding, are consistently found. In rejection there seems something very similar

*See p. 163.

to belief in the magic of purging and taboo. It is perhaps an echo of this that one finds in the current phrase "put away" as applied to commitment to boarding schools made by the Court.

Making allowances, then, for a very large subjective element in the basis of blame, we are left with the question as to whether there were in this small group any common characteristics which could account for their becoming conspicuous, if not influential.

(*b*) *Group A.—Personality of delinquent girls described as leaders.*

As regards the behaviour which precipitated their appearance in Court, we found that all six girls were, at the time of the study, rebels from home and from school.* In each case there had been more or less open revolt expressed in running away, staying out late, playing truant, and defying the major regulations of home and school.

General physical condition was excellent in all six cases, one girl needing only minor attention. Four of them were above the average in height and over-weight for height and age in amounts varying from fourteen to thirty-eight pounds. Psychiatric examination was unfortunately only available in one case of marked over-weight. The report on this case stated that "Physically she has a marked glandular disturbance which has become more chronic during the past few months, and which probably accounts for her being thirty-three pounds above average normal weight for her height and age. As is usual in such cases there is probably more or less widespread glandular disturbance, although in all likelihood the fundamental disorder is in the nature of hypopituitarism."

In every case there was normal birth and development, and the children were noted as healthy and strong.

The age of menstrual onset varied from twelve to fifteen years.

Though we have no standards by which to judge of energy, capacity and output, reports and observations consistently indicated a degree of physical activity that was unusual. In every case this had been noted by parents since early childhood. This sort of description is typical:

"I don't know what to do with Joan when she comes home. She is on the go all the time. I said to her, 'Sit down a bit, and let's have a little visit, I don't often get the chance to talk to you'—but she couldn't settle down at all. I never saw anyone so full of energy as she is."

Largeness and muscular strength were mentioned more frequently as a basis of conspicuousness and attraction than beauty ("pretty,"

*The technical petitions under which they were made Wards of the Court were various: in three cases "danger of leading an immoral life;" in two "beyond control" of parents; in one, larceny.

" cute," etc.). Only one girl was universally described as pretty. Two were of irregular feature and ungainly figure, and in these two cases physique was very often specifically mentioned by both boys and girls. One was driving a heavy fruit truck at the age of twelve. Three were described as strong and " hefty " enough to take part in boys' games.

According to the Stanford Revision of the Binet Simon Scale, two of Group A are placed in the dull normal group (quotients 83 and 88); three in the normal (quotients 98, 105, and 106); one in the superior (quotient 114). The two dull normals were also given the Pinter-Patterson Performance Test, on which the subject with the lower of the two quotients (83) scored excellently at adult level throughout. The other (88) made an extremely scattered achievement. In further analysis of the tests results as a whole, the examining psychologist noted two general tendencies:

(1) That vocabulary and abstract reasoning were relatively poor.
(2) That there was a quickness of response, combined with good initiative and attack.

Anxiety under test conditions was noted in three cases out of the six.

No formal educational tests were given. Judging from their school reports, all of the group except one covered with little difficulty all the work that was required of them in their elementary schools.* Only two had started truanting from their elementary schools: of these one was doing " very good work " in the top standard (a girl of normal intelligence); the other (dull normal), was also in the top standard, but her work was poor except in English, when her interest was aroused by dramatization. The other four (including one rated dull normal, two normal, and one superior in intelligence), all passed up to junior high school. The girl of dull normal intelligence failed in all her subjects except physical education and general science, and was a social difficulty within three weeks of her transfer. The other three were constant social difficulties, though their work, when they troubled to do it, was good.

Thus it seems probable that the universal rebellion from school was partly caused in two cases by educational retardation due to inherent lack of capacity.

Remarks upon other characteristics must, in the absence of norms, be taken for what they are worth as subjective estimates based upon observation and opinion.

The special abilities of these girls are noticeably such as involve physical activity and social expression. Three of them are outstanding

*Compulsory school attendance extends up to the age of 18 in California, except where special " working papers " are obtained. Transference to secondary school ordinarily takes place in the fourteenth year.

athletes. One, not an athlete, has dramatic ability, and had apparently attracted attention for mimicry since quite early childhood. Four out of the six have at one time or another made an impression by their speeches at school meetings, and this in spite of the poor vocabulary rating in three cases. Two have singing voices attractive enough to make them in demand for school entertainments. The only one without a special ability involving physical display is exceptionally good looking. Interests observed and described by the girls themselves seemed to centre very closely round these special abilities. Not one of them was interested in reading: such books as had been read were mostly of the western adventure variety. Little handwork of any kind was done outside of school hours. All of them disliked domestic occupations. Five out of the six could drive cars; their enthusiasm over different makes of cars, and over their own and their friends' speed records, stood out even for the West. One girl, for instance, drove for a detective uncle during her holidays making speed records along the Pacific coast. Another, dressed as a boy, was offered a job packing cars in a parking station.

Asked what was their idea of "a good time," all of them spoke of occupations involving physical and social activity. For instance: "My idea of a good time is to go down to the beach and have a good lot of fun. Get as many people as I can to go too, have a good swim in the plunge and then go to show, and afterwards have a party at home."

Wishes expressed as ambitions or in day dreams also involve for the most part social activities.* Five of them speak of constant day dreaming of success of an athletic type; and of heroism and authority based upon physical superiority. Only two state as their ambition anything involving married life or domesticity. The professional ambitions actually stated were: gym. teacher (2); nurse (1); actress (1); champion swimmer and skater (2).

All of them had a lively interest in boys and their attentions. Four had had sexual relationships; three on more than one occasion and with different people. All of them appeared to be sexually attractive.

Summarizing these observations, the common conditions present seem to be excellent, possibly superior physique; high level of energy output in physical activity; interest in and enjoyment of social relationships; a general "turning out" of attention. The level of general intelligence is sufficiently varied to discount its significance as an isolated factor. There was, however, the psychologist's general note of quickness of response and good initiative and attack.

*It need hardly be pointed out that this may be due to the fact that these were the only desires which the girl cared to express or was able to articulate.

Over and above these common conditions we seem in this small group to have illustrations of social behaviour which is the outcome of three differing kinds of personality* of which examples will be given.

I.—*Peggy* (15).† Large muscular build, cropped hair, harsh voice. Average intelligence. Consistently posed as a boy during delinquent activities (stealing, running away). Had heterosexual relationships, but also apparently played masculine rôle in homo-sexual relationships. Extravagant fabrication. Much fantasy. Extreme changes of mood, but prevalently cheerful, optimistic, and friendly. Sometimes shows extreme lack of appreciation of social consequences. Diagnosed by psychiatrist as an epileptic type of personality with widespread glandular disturbance.

Further discussion of this case takes us far outside the boundaries of this study. The significance of it here is the social effect of an exceptional personality. There is good evidence that Peggy had aroused unusual attention and curiosity since the age of about twelve. The case study contains highly emotional letters written to and about her.

Eleven associates of both sexes, in ages ranging from twelve to twenty-six, and intelligent quotients from 77 to 111, laid the responsibility for their delinquent behaviour upon this girl.

II.—*Dina* (15). Average height. Excellent physique, with particularly good posture and co-ordination. Part American-Indian ancestry evident in clear-cut features, black straight hair, dark eyes, warm colouring. Concentrated, alert expression when interested. Quickly animated; smiles readily; laughs with abandon. Dress shows a liking for bright colour and simplicity of line.

Intelligence quotient 88. Answers very definite. Arithmetical reasoning poor. Highest achievement: interpretation of fables. Much scatter on Pinter Patterson Performance scale. Method of trial and error in puzzle type of test; in some cases reached only five-year level. Picture completion and imitation at adult level.

Blamed for causing disturbances in neighbourhood and school. Distracted attention in class by personal comments and mimicry. Work poor, except in English dramatization. Persuaded children to go from school playground to forbidden street market. Stayed out late. Was beyond mother's control.

Protested against admission to boarding school from the Court, but stated later she had made up her mind to become President of the Student Union. Was President twice during three years' residence.‡ Public opinion about her changed very rapidly; group enthusiasm shown both on election and defeat. Always seemed able to win momentary approval, though was much criticized in her absence as "two-faced," "cruel," "disloyal," etc. Her comments about other people generally inconsistent and unscrupulous; she readily "played them off" against one another, taking evident delight in the result. Could generally win a point in a public meeting though her logic was execrable. A typical example is found in the following scene

*The word personality is used here for the totality of the individual's attributes, both inherited and acquired, and their inter-relations.

†See p. 163.

‡Elected by popular vote, not on the whole with approval of those in authority. School population about fifty girls, aged 12-18.

An election meeting.—Dina (President) in the chair. Games captain to be elected, and two nominations duly put forward by the meeting. Dina does not wish either candidate to be elected, and, by means of notes passed round the meeting, puts up a " dark horse " candidate. Messages in her writing handed round the meeting : " Vote for Betty, the dark horse." She smiles and nods in confirmation of her message to those who catch her eye. Betty is elected by a large majority.

Speech from the house : " Madam President, I don't think it's fair. You tell us not to tell other people how to vote, and then you go around and tell them all to vote the way you want them to yourself." (Various other voices chime in. Dina looks questioningly at her friend, the ex-President.)

Dina : " I don't think I did say that, did I ? " (Pause.) Then, with growing confidence : " Well, anyhow, a dark horse election is different, isn't it, Katherine ? You can do anything you like then." (Further pause, then with a smile, and a manner of great conviction.) " Anyhow, you girls shouldn't follow what people tell you. You should be more of leaders. You should make up your own minds and follow what you think yourself about things and not wait for what people tell you to do."

No further objection expressed. Both nominees defeated by the " dark horse " make speeches indicating their approval of the procedure and their willingness for the other candidate to take office. The visitor is taken aside by the President as she leaves the room : " Gee, did you see that ? Didn't we fool 'em ? "

Considerable ability shown in dramatics. Was several times playwright, producer, costume designer, and hero or heroine of the same show, conceived and executed with little preparation. Took long part of *Tyltyl* in Maeterlink's " Blue Bird " with enough success to make repertory theatre critic interested in her future.

A long record of Dina's achievements, of which it has only been possible to give brief extracts, seem to show that she is a person with exceptional facility in self-expression. It is suggested that this is due to emotional integration which is possibly unusual. She seems rarely inhibited by conflict, either of an internal or external source : in fact her social capacity seems partly to lie in her ability to deal with immediate situations in isolation from one another : a mobility of adjustment* which wins momentary but not consistent response. There seemed nothing laborious about her achievement of social success. She was honest and even witty about her own shortcomings, often converting them into sources of attraction. In physical and mental health she survived what might have been thought to be predisposing causes of disorder. Her father died of tuberculosis when she was twelve. Her family were for years dependent upon unsympathetic relatives and public charity. The mother, though well intentioned, was slow and ignorant, and tried to keep control

*See Jung, C. G. : *Psychological Types*, 1923, p. 419, for distinction between adjustment and adaptation. The extraverted type is " adjusted, but not adapted, since adaptation demands more than a mere frictionless participation in momentary conditions of the immediate environment."

of Dina by severe thrashing. Her only brother was mildly epileptic and a drifter. There was always financial stress at home, and an incredible lack of the barest comforts.

III.—*Helen* (17). Large build. Considerably over average in height and weight. Ungainly in figure; small head in proportion to heavy shoulders, bust, and hips. Features irregular. Deep, rather harsh voice. Pleasant smile, but usually somewhat glum expression.

Intelligence quotient, 106. Little scatter. Decisive. Exceptionally quick in response. Performance rating, average. Motor imitation particularly good.

Blamed for encouraging truancy. Ran away on several occasions, friends going with her and collaborating in "borrowing" car without permission. Took clothes and jewellery, afterwards returned.

Good athlete (swimming, netball, baseball), with some ability in coaching. Pleasant soprano singing voice.

At boarding school was several times nominated for offices of President, Vice-President, etc., but not elected. Captained netball team, was "Yell Leader," and edited school paper (all by general election). Leading articles full of moral judgments. In any school crisis was apt to express a definite point of view, and to get a group of sympathizers (often an "opposition" party).

For instance, two girls had had a violent disagreement. One had sworn and the other had used her fists.

Helen (addressing a group of non-participants in the school grounds): "It's not ladylike for people to hit each other. I should have thought you would have shown more respect for Miss X* than that. Think of all she has done for the school, and then think of hurting her by having people go around hitting each other. I know she shouldn't have said it, but I don't care whether it's Kate or anyone else, she can't go through life hitting everyone who says something that offends her. I think we ought to quit it, that's all."

Helen's ideals, to which she very often gave expression in dogmatic style, bore little relation to her conduct. Almost always expressions of identification with adult authority. Speeches and articles seemed directed against her own projected feeling of guilt. She periodically wrote long remorseful letters to those responsible for her.

In this case home conditions had undoubtedly given rise to conflict. Until her mother's second marriage, when she was five years old, Helen had absorbed her entire attention, the father having left them before her birth. The stepfather was a man of stern authority, constantly asserting himself as head of the household. Helen openly rebelled against him. At the same time she showed little consideration for her mother, though she talked and wrote constantly about her. It seems possible that her self-assertion at school, and indeed in other groups, was due to emotional needs contingent upon this conflict.

*The School Principal.

(c) *Family relationships of delinquents and non-delinquents (Groups A and B).*

Stress has already been laid upon the universal characteristic of rebellion, which apparently did not occur in any marked degree until the adolescence of the girl. The fact of rebellion itself and the consequent increased range of activity, with exposure to commercialism and isolation from the protective groups to which a child normally belongs, may be of primary importance in accounting for her prestige. It should be considered both as a consequence and also as a further condition. This leads us on to consideration of the family and home circumstances of those blamed as leaders.

Such common circumstances as were found in the home conditions of Group A, will be considered only in relation to the home conditions of a comparative group of six girls quoted as desirable leaders by teachers and contemporaries in a co-educational school of 2,000 pupils.

There were marked contrasts between the family relationships of the two groups in the following respects :

(1) In no family in Group A was the parental relationship complete during the delinquency period of the child. In four cases the father was dead, and in two the parents were separated, the child living with the mother. There was thus no father in the home of the delinquent leaders at the time of the study. The two stepfathers were in both cases sources of antagonism and conflict.

In Group B there was no case of separation. One father had died, but the mother had not married again.

(2) In view of the absence of the father from the homes in Group A, relationship with the mother is of particular importance. Two were hard working, conscientious, and reliable. They were responsible for earning the family living, and complained that they were too busy and too tired to give their children proper attention in the evening. Two others had themselves been involved in social irregularities (on account of which they were notorious in the neighbourhood). Of the remaining two, one suffered from neurosis and the other from incipient psychosis, of a paranoid type. The daughter in this case was the victim of her mother's constant suspicion and investigation. In all these cases there seemed only spasmodic affection and loyalty shown on both sides of the relationship. For the most part there was either complete indifference to the mother's authority or open rebellion against her.

In Group B there was one stepmother, but the maternal grandmother had taken responsibility for the child. In two cases the mother supplemented the earnings of the father, but in no case was she the sole supporter.

Employment here seemed to represent a source of broadening interest rather than fatigue. In every case there seemed steady affection and loyalty on both sides of the relationship.

(3) In Group A antagonism between the parents during the childhood of the girl was overtly expressed in four of the cases, and in two of these was carried over into the mother's relationship with the stepfather.

In Group B there was no openly expressed antagonism between the parents. In two cases the relationship was described by the parents themselves as unsatisfying, but in both these cases there was agreement between the parents as far as the children were concerned. Their lack of adjustment did not appear to cause disturbance in the family life as a whole.

(4) In Group A the largest family of living children consisted of three, and in three cases the subject of the study was the only living child of her parents.

In Group B the largest family consisted of seven, and there was one only child.

(5) In Group A there had, without exception, been a previous delinquency record on the part of elder brothers and sisters, though we had no evidence that this had gained for them the same kind of publicity that it did for the subject of the study. In only one case had the leader taken helpful responsibility for a younger brother or sister, though in every case she was noted as " domineering."

In Group B there was in three cases a younger brother or sister with definite mental or physical handicap (two feeble-minded. One paralytic.) A strong sense of responsibility seems to have been developed towards these children. In addition two other subjects in this group had, at various times, taken over almost complete responsibility for the management of the household, while the mother went to work.*

This marked contrast between the degree of social responsibility given to, or adopted by the girl in her home, seems significant in view of the later contrast between their appreciation of broader responsibilities.

(6) Members of Group A had practically no developed interests that could be pursued in home or in school. Nor did they entertain their friends at home with their mother's approval. In contrast to this, all the members of Group B spent the main part of their spare time in interests

*In one instance a girl of twelve years old had managed a household of four people while the father earned the living and the mother went to the university to work for a higher degree.

which could be and were pursued at home, and in most of the families the children's friends were welcomed.*

It is not possible here to go further into the similarities, both personal and environmental, of Groups A and B, but it is perhaps worth mentioning a few characteristics common to both groups.

(1) There was only one appreciable health handicap. Energy was noted throughout. Physical accomplishments of a high degree were almost universal.
(2) General intelligence according to test shows a range of distribution ranging from 83—116. There are no dull normals in the non-delinquent group, and as in the delinquent group, only one is superior normal.†
(3) In every case the leader seemed to be regarded as the dominant member of her own household at the time the study was made.
(4) In no case was the leader the youngest member of her family.
(5) In all twelve families the father was either absent from the home during the adolescence of the child or was rather conspicuously lacking in initiative and general capacity for social adaptation.

(*d*) *Girls described as followers* (*Group C*).

It is evident that both sides of the leader-led relationship must be taken into account in order to reach any suggestion as to how the resulting activity comes about. Our studies of those who were quoted as being influenced have not been full enough, either from the personality or social standpoint, to justify more than a few comments, possibly of eliminative value. They are taken from a group of fifteen people of both sexes (five male and ten female), in ages ranging from twelve to twenty-six. The criterion of selection was again based upon social opinion, but was confirmed by the account of the subject. They all maintained that they had been influenced by a member of Group A.

There was nothing outstanding in physical condition. Only one was over-weight for height and age, and three were under-weight and in poor condition—a proportion corresponding to that true for delinquents as a whole in this county.

*Financially, there was no appreciable difference between the two groups, though two of the parents had professional status in Group B and none in Group A. With these two exceptions the parents' education was comparable.

†Cf. Leta S. Hollingworth: *Special Talents and Defects*, 1923, p. 193, who suggests that there is an optimum range of I.Q. within which popular leadership is extremely frequent, but above which it is very improbable.

The Intelligence Quotients of Group C vary from 77 (borderline) to 117 (superior adult). There was only one borderline; four dull normal; seven normal; and three superior adult.

In the medical and psychological reports available on the members of Group C, special note was made of emotional instability in seven cases, and of slowness of response, limpness, and apathy in two.

Interests showed a rather greater variety than in Group A. Out of twelve studied from this standpoint, half enjoyed mainly interests involving physical activity, and half interests of a more intellectual, sedentary, contemplative type.

One third of the members of Group C had been brought up in institutions or foster homes; one third in homes of incomplete parental relationships, either through separation or divorce; and one third in homes with complete parental relationships.

All the members of Group C had, in the nature of the selection, been involved in delinquencies. Out of the seventeen, we were only able to trace five who had not been delinquent in a way which rendered them liable to Court action before they came into contact with the "leader." Clearly, therefore, there were in the large majority of cases predisposing conditions on the side of the "follower" to account for the joint activity.

Considered as an isolated factor, general intelligence does not seem to have been of great significance in the leader-led relationship as it presents itself in this study. Relatively, in nine cases members of Group A are superior in general intelligence to those whom they are said to have influenced. But in six cases the leaders have relatively inferior general intelligence. *

The same is true of chronological age. In eight cases the "leaders" are older; in seven, younger, than the "followers."†

In physical maturity, represented by menstrual onset, the leaders are relatively retarded. Out of eight cases recorded in Group C, seven were premature to their respective leaders.

V.—Interpretation—leader-led relationship.

Qualitative analysis of the relationship of one personality to another when "influence" is said to take place does not seem to suggest any simple hypothesis adequate to account for the variety of facts presented in this very limited study. If we define a "leader" as one who is more

*The relative superiority of leader to led varied from 1 to 21 points in terms of intelligence quotient; of led to leader, from 3-16 points.

†The relative superiority in years of leader to led varied from 1 to 3 years; of led to leader from 1 to 10 years.

than usually able to condition the response of other individuals or groups in such a way as to make this response consistent with the satisfaction of the one supplying the conditions, then it seems that all our subjects come within this definition. This conditioning of response must represent a supplement. Taken at its simplest the supplement may consist in a form of service which A, the leader, is able to provide, and which, in the ordinary course of events, is not available to B and C, the followers. Thus in a good many cases we find A apparently attracting initially through possession of pocket money ; through borrowed cars ; through providing direct or indirect sex stimulus ; or merely supplying ways and means not otherwise accessible to the follower. Here, relative home circumstances and other fortuitous environmental conditions may go a long way towards providing adequate explanation of the relationship.

In its more subtle form, the supplement seems to consist in what the leader, as a person, represents to the follower, in emotional terms, at any one particular time. It appears that the leader is often one who, perhaps only momentarily, supplies just that contribution which makes for emotional release on the part of the follower. Such release may be brought about by added suggestion bearing upon one side of a conflict, or by a shelving of conflict due to the acceptance of new authority in the form of the leader. Where the leader constitutes the new authority, a situation sometimes seems to arise in which there is a relationship of extreme dependency ; a relationship of a rather different character to the one based upon obvious homo-sexual attraction. This type of relationship we found occurring mainly, on the followers' side, amongst those who had been brought up under institution or foster home conditions, and on the leaders' side amongst those who were conpensating socially for their own emotional stress.

Assuming that the provision of the appropriate supplement for emotional release is a true description of leadership, we are again forced back to the problem as to how the leader, wittingly or unwittingly, provides just this supplement. Circumstances may constitute an extremely favourable setting. They may be an essential condition, but cannot, it seems, constitute the only condition, for similar circumstances appear to occur frequently without producing similar results. Exceptional energy may also be a favourable, or even an indispensable factor. In some cases increased emotional drive towards social expression seems relevant to the explanation : but here again we are reduced to discovering how this expression produces response on the whole consistent with and not contrary to the satisfaction of the leader. Many of the followers, that is to say, also seem to compensate by social aggressiveness, but arouse

antipathy, rather than compliance. The phrase "superior social intelligence"* as compared with "average general intelligence" was used by a psychiatrist in his report upon one of the subjects of the study.† The difference between general intelligence, as indicated by tests, and capacity for social adaptation is of course clearly recognized. It seems probable that the disparity between findings as to general intelligence and social behaviour is to be explained rather in terms of temperament and general pattern of response developed as a result of experience, than it is in terms of a different kind of innate intellectual ability. This question, arising out of a study mainly sociological, may perhaps fairly be handed to the psychologists for their further consideration.

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*Cf. Hollingworth, Leta S.: *Special Talents and Defects*, 1923, p. 194. It is suggested that "social intelligence" is probably not a specialized capacity but an "optimum section" of the intelligence curve (determined by ratio to the median intelligence of those led), combined with certain physical and temperamental traits.

†See Case I, p. 163 and p. 170.

RÉSUMÉ.

QUELQUES ETUDES DE JEUNES FILLES DÉLINQUANTES DÉSIGNÉES COMME MENEUSES.

Parmi un petit groupe de jeunes filles adolescentes délinquantes auxquelles, dans un " Californian Juvenile Court," on a reproché d'avoir eu une " mauvaise influence " on fit six études spécielles. Celles-ci embrassent les dépositions des voisins et des camarades aussi bien que les rapports médicaux et psychologiques. On les compare avec d'autres études de jeunes filles non délinquantes caractérisées comme " meneuses " et de celles caractérisées comme " menées."

Dans l'analyse de la relation meneuse-menée certains traits (un niveau extraordinairement haut de dépense d'énergie, beau physique, aptitudes dépendant de l'habileté physique, etc.) se manifestent chez les " meneuses " délinquantes. L'intelligence, générale, comme telle, ne semble pas jouer un rôle important. Certains types de personnalité (y compris ceux montrant une intégration émotive supérieure : un type plutôt rare, le homo-sexuel, diagnostiqué du point de vue médical comme " le type épileptique de personnalité " : et ceux ayant une surabondance d'activité sociale due à la force émotive) se trouvent dans ce groupe. La rang social relatif de meneuse et de menée a une grande importance pour l'explication de la relation, et l'on suggère qu'elle forme une condition essentielle de cette relation, mais non pas son explication entière.

ÜBERSICHT

EINIGE BEOBACHTUNGEN JUGENDLICHER VERBRECHERINNEN, DIE ALS ANFÜHRERINNEN BESCHRIEBEN WURDEN.

Aus einer kleinen Gruppe jugendlicher, verbrecherischer Mädchen, denen man in einem kalifornischen Gericht für Jugendliche schlechten Einfluss vorwarf, wurden sechs Beobachtungen gemacht. Diese schlossen Aussagen von Nachbarn und Genossen neben einem Bericht über Persönlichkeit und Familienverhältnisse ein. Sie werden in Bezug auf ähnliche Beobachtungen nichtverbrecherischer, als Anführerinnen beschriebener Mädchen und auch in Bezug auf Mädchen betrachtet, die als Anhängerinnen bezeichnet werden.

In der Analyse des von der Führerin geführten Verhältnisses findet man bei den jugendlichen Verbrecherinnen (Anführerinnen) gewisse Züge (namentlich einen hohen Grad von Kraftaufwand ; guten Körperbau ; Fähigkeiten, die von körperlicher Gewandtheit abhängig sind u.s.w.) vor. An und für sich scheint allgemeine Intelligenz nicht bedeutend zu sein. Gewisse Arten von Persönlichkeit (mitsamt denen überlegener Gemütsergänzung ; einem verhältnismässig seltenen Typus-dem homosexuellen, ärztlich bestimmt als dem ,, fallsüchtigen Typus der Persönlichkeit " ; und jenen, die wegen Überanstrengung der Gemütsbewegungen gesellschaftlich übertätig sind) kommen in dieser Gruppe vor. Die relativen sozialen Verhältnisse von Anführerin und Anhängerin erweisen sich von grosser Bedeutung, um die Beziehung zu erklären. Darauf wird hingeweisen, dass diese eine wesentliche Bedingung des Verhältnisses bilden mögen, obschon sie keine genügende Erklärung davon geben.

EXPERIMENTS ON THE ANALYSIS OF COGNITIVE PROCESSES INVOLVED IN MUSICAL ABILITY AND IN MUSICAL EDUCATION.

By JAMES MAINWARING.

(*From the Department of Education, University of Birmingham*).

I.—*Introductory. Aims of investigation.*
II.—*The basis of music and of musical ability. Its cognitive elements.*
III.—*The perception of auditory experience and the eduction of relations.*
Experiments I, II, and III.
Preliminary conclusions.
Experiment IV, Series A and B.
The influence of the age factor.
IV.—*The recall of auditory experience and the analysis of auditory imagery.*
Experiment IV, Series C.
V.—*Intercorrelations, and correlations with "g."*
Application of the tetrad equation.
General conclusions.
VI.—*Summary.*

I.—Introductory.

Musical education has not shared in the increased interest and enormous improvement in general educational practice which the application of experimental psychology to educational problems has made possible during the last decade. "To read a simple piece at sight" is still regarded as a task of sufficient difficulty as to justify its inclusion in an examination for a musical diploma, which examination involves such a degree of technical skill that the candidates must have spent years in acquiring the necessary motor co-ordinations. A literary education, which relied on the laboured recital of literary masterpieces, and which left the educand unable to read or write, would be a process hardly less futile.

There can be no real improvement in musical education until there is some generally accepted and intelligent concept as to the nature of musical ability itself, and, hence, an understanding of what should constitute the aim of musical education. Even amongst psychologists no such concept is generally recognized. Stumpf seems to regard musical ability as efficiency in perceptual discrimination between auditory

experiences. Spearman attributes such functional unitariness as is presented by the various manifestations of musical ability to " g," the general factor in " Intelligence."* Other psychologists have limited their investigations to the affective reactions to musical stimuli, tending to assume in their subjects the effective functioning of the cognitive processes involved in the æsthetic judgment. The most generally accepted factor popularly regarded as an essential constituent, or even as *the* essential constituent, in musical ability, is some form of " virtuosity," the skilful manipulation of some mechanical device for the production of sounds. The executant may be " playing from a score," like a typist copying a letter, reacting mechanically to the visual stimulus; or he may be " playing from memory " in the sense of performing a series of operations so often repeated as to have formed a mechanized sequence similar to that involved in putting on one's clothes.

While the acquisition of this kind of skill is too often regarded as the sole aim of a musical education, it cannot be properly regarded as constituting musical ability at all. A deaf man could be taught to " use " a piano in this way, as he could be taught to use a typewriter, and machines have been invented capable of carrying out precisely the same operation of translating a roll of musical symbols into a series of sounds.

Even more typical of the general attitude towards musical ability is the normal reaction of the " skilled executant " to the man who " plays by ear." "A" finds that he can remember a melody, and after experimentation, learns to reproduce it on some available instrument. With further experience, he gradually acquires the ability to make immediately the requisite motor responses to the imaged stimulus. This is really a relatively easy process. It is almost universally possible to some slight degree when the instrument used is the human voice. It is hardly less simple when the instrument is some form of melodic device like a dulcimer, Pan-pipe, or fife. While it is far more worthy of being called musical ability than mere virtuosity, however skilled, any serious development of the ability is usually regarded with an emotion akin to awe, and not infrequently, especially when it is not accompanied by an acquired knowledge of musical symbols and notation, by a measure of contempt.

The purpose of this investigation is the analysis of the cognitive processes involved in musical ability into their specific factors; to determine how far these are innate, general, and variable; how far they tend to intercorrelate, and to show correlations with " g ";† the extent

* *The Abilities of Man*, p. 349.

† This symbol for " The General Factor in Intelligence " or "Mental Energy," consistently with the terminology used by Spearman in *The Abilities of Man*, is used throughout.

to which they are capable of development by training; the extent to which they tend to show natural development apart from training; and the extent to which any improvement due to training is transferable. The ultimate aim is the eduction, from the results of this investigation, of general principles applicable to musical education and to the musical development of the child.

A necessary preliminary, however, is a definite concept of the nature of music itself, the field in which the ability is to be exercised.

II.—The basis of music.

Any sound, produced by a regular series of vibrations, must have, and can only have, four cognizable attributes or characters.*

Firstly, it has a definite, nameable "pitch," dependent on the frequency of the vibrations which cause the sound; the higher the frequency, the "higher" is said to be the pitch. Secondly, it has the attribute of "intensity," a degree of loudness. "Loudness is not merely dependent on the physical strength of the stimulus, it also involves at least two individually variable psychical factors. The first of these is connected with the varying "aggressiveness" of tones according to their pitch, in consequence of which high tones appear louder than low tones, even when the stimuli are of equal objective strength. The second subjective factor consists in apparent variation of a tone which is objectively of consistent strength; a tone may often appear to gain or to lose in loudness after it has been first heard."† Thirdly each sound has a temporal character, the time during which the sound persists; and finally, each sound has a characteristic quality or "timbre," dependent mainly on the way in which the sound was originated.

Between any two sounds there can exist only a relation of difference in any one or more of these four attributes. "Music," from the whistling of the office-boy to the elaborate structures of Elgar, or the orchestral intricacies of Berlioz, consists, and can consist only, in the grouping of sounds in some kind of systematic relations based on one or more of the above relations of difference.

Early church music, such as the fourth century chants associated with the name of Ambrose, Bishop of Milan (374-97), consisted in series of sounds differing only in pitch. On the other hand, pitch is neglected

* Henry J. Watt (*B.J.Psy.*, VII), in "The psychological analysis of the theory of hearing," includes a fifth attribute, which he calls "voluminosity," but this seems rather a quality of pitch.

† C. S. Myers and C. W. Valentine: "Differences in attitude towards tones." —*B.J.Psy.*, VII, pp. 74-75.

by many primitive peoples in the construction of their quite elaborate rhythmic music, such as that of the Sarawak Malays, of which records have been made by Dr. C. S. Myers.* A rhythmic pattern may be constructed in three ways : by grouping sounds which differ in intensity, a relatively loud sound recurring with periodic regularity in a series of sounds ; by the repetition of a group of sounds which bear to one another some definite temporal relation, such as, for example, may be produced by means of a Morse buzzer ; and thirdly, by a combination of these two methods.

Just as in any two " similar " geometrical figures the absolute length of any line does not affect the " similarity " of the figures, so any two series of musical sounds are " similar " when the relations existing between the sounds of one series are reproduced proportionately in the other series. A series of sounds differing in pitch is recognized as the " same tune " as any other series to which it is " similar " in the above sense, irrespective of the absolute attributes of the individual sounds. A melody is recognizable as such, played on the bassoon or the piccolo. In the same way, a rhythmic pattern is unaffected by the absolute speed of the whole rhythmic group, so long as it is not so slow or so quick as to obscure the relations between the members of the group. So much so is music a matter of relations that the general system of " staff " notation, employed for all orchestral and instrumental writings, uses symbols indicating only relative or rhythmic duration, while the system of " sol-fah " notation, so popular with choral groups, employs symbols which, even in the realm of pitch, indicate only relations of difference, and as individual symbols they are meaningless. The following passage might be performed at an infinite number of speeds within the limits mentioned above :



The following phrase might be performed in any " key," at any reasonable speed :

| d : - | - : m | s : l | s : m | d : - | - : |

The attribute of intensity is used in music for the differentiation of members of a rhythmic group, for the attraction of attention to particular sounds to which it is desired to give greater prominence, and for affective purposes.

* " Study of rhythm in primitive music."—*B.J.Psy.*, I.

The Sarawak Malays made use, in a primitive form, of the fourth character of sound, the attribute of quality or " timbre," by beating their rhythms on different kinds of " instruments " such as the " tawak " or gong, and on different kinds of drums.

As the most complex forms of music can consist only in combinations of sounds " systematically differentiated " in these four ways, it follows that musical ability, being confined for its exercise to a world of sound differentia, must at least include, as a fundamental element in its complexity, the cognitive ability to educe, between sounds, these relations of difference. As it is assumed, at least in this stage of the investigations, that everyone who can hear at all can educe within reasonable and sufficient limits a relation of difference in loudness, and that a sound produced on a saxophone is different from one produced on a harp, the first group of experiments is confined to the perception of differences in pitch and rhythm.

III.—The perception of auditory experiences.

This group of experiments was devised to determine : (1) Whether the ability to educe relations of differences of pitch and of rhythm exists as a " special ability " ; (2) Whether either or each of these two elements in auditory perception exists as a unitarily functioning special ability ; (3) The degree of correlation exhibited between these two abilities, inasmuch as either can be shown to exist as a specific ability, and the degree of correlation each has with " g " ; (4) The extent to which each shows development by (*a*) natural growth, (*b*) special training, and (*c*) normal musical training ; (5) The extent to which any such training is transferable.*

Experiment 1.—For the first experiment, a mixed class of fifty-two children was submitted to a group test. The test employed (see Appendix, Test Series A, Eduction of Pitch Difference, and Test Series B, Eduction of Rhythmic Pattern) comprised six graduated tests on pitch differentiation (Tests I to VB), and two on the perception of rhythmic pattern (Tests VIA and VII), involving eighty-eight questions. Tests I to III investigated the mere eduction of difference in pitch ; Tests IV to VB used the relation as a " fundament "† and investigated the ability to educe relative differences ; Test VIA employed mechanical rhythms ; Test VII used rhythmic verse as a medium ; the " Buzzer " tests, Test

* A complete analysis of the training received by this group is reserved for a discussion on " Trainability," the results of the experiments on which are not yet complete.

† See Note †, p. 181.

VIB, were not used until Experiment IV. The complete test, exactly as submitted, is appended.

The class consisted of twenty-three girls and twenty-nine boys, of an average age of 10·6 years, being respectively the girls' and boys' sections of the "Standard IV" of a good elementary school. The boys had received no special musical training, while the girls had received three years' ordinary elementary school training in singing and " music." They had not been selected for this training, but had received it merely because in that particular school all girls received it. Children who had received any private music lessons of any kind, or who had musical relatives, were instructed to state this on their papers.

Conclusions.—The first conclusion suggested by the results of the untrained group was the general poverty of each of the abilities tested, but more especially of the ability to perceive rhythmic form. The average score in this section of the test was only 42·4 per cent, and as in many cases there were only two possible answers, the result seems to suggest that the ability to perceive even the simplest rhythmic pattern cannot be assumed to have any general existence. Like the similar processes involved in the perception of spatial design in some of the various form-board and pattern tests, as distinct from the unsymmetrical jig-saw tests, the cognitive process involved is not merely the eduction of a spatial or temporal relation between two given fundaments, but involves also the building up of a number of such relations into a concept of symmetry and pattern. This process is distinct from the time relation tests of Miss Carey,* who investigated the ability to differentiate between unrelated temporal relations, while rhythm is a system of interconnected temporal relations. While this is discussed more fully in the general conclusions in Section VI, it would seem advisable here to suggest that the apparently fairly general physical reaction to regularly repeated sounds and any pleasure derivable therefrom and therein, do not necessarily involve the purely cognitive ability to perceive rhythmic pattern.

The scores obtained by this group in the pitch differentiation tests were higher than the " rhythm " scores, the mean score being 73·0 per cent and the median being 73·5 per cent. Again, as 61 per cent of the maximum marks gainable demanded the mere ability to perceive that two sounds heard were of the same pitch or not, the average and median scores are again low.

The second conclusion suggested is the individual variation in the possession of each of the abilities. In the rhythm section, the marks

* " Factors in the mental processes of school children."—*B.J.Psy.*, Vol. VII, p. 462.

gained varied among the twenty-nine members of this group from 27·7 per cent to 72·2 per cent, while in the pitch differentiation tests the scores varied from 43·5 per cent to 99·2 per cent.

The results of the trained group show a considerably higher score in both abilities, the average in the rhythm tests being 73·6 per cent and 84·8 per cent in the tests on pitch. In the latter case the median score was slightly higher, being 88·0 per cent. While there was, therefore, the suggestion that the training had improved both abilities, unless the very definitely higher scores were due to sex difference or to mere chance, the scores show the same individual variation. That the improvement is not due to chance is suggested by the greatly increased minimum score in each case; in the rhythm section the scores varied from 50·0 per cent to 94·4 per cent, and in the pitch section from 65·8 per cent to 100 per cent. Again there is the same inferiority in the ability to perceive rhythmic form.

The degree of correlation* between the two abilities as shown by the boys' scores was ·31 ±·081; in the girls' group it was ·028. In all the tests the correlation between these two abilities has been consistently low; this is the only case, however, which has shown a complete lack of any significant correlation.

The testees who were, or who had been, receiving private music lessons, or who had musical relatives, did not show any marked or consistent superiority over the others, except in the interesting case of one testee who claimed an avuncular "drummer," and whether by chance, or by the influence of heredity or environment, she certainly achieved first place in the test for rhythmic perception. She made no claim to have received any special tympanic instruction.

Experiment II.—The test was again submitted, in the same school, to a younger class of thirty-one girls, of an average age of 9·6 years. These testees had received for two years a similar training to that of the girls of the previous group. Again, they had not been specially selected either for the training or for the test, but comprised a complete "standard" in the school.

The results confirmed the main conclusions suggested by the previous test. The mean score of 59·6 per cent gained in the rhythm section was again low, and again lower than that gained in the pitch differentiation section, which was 64·4 per cent.

There was an even greater individual variation, the scores in the rhythm section ranging from 27·7 per cent to 83·3 per cent, and from 30·1 per cent to 89·7 per cent in the section on pitch.

* All correlation coefficients were calculated by means of the product-moment formula.

The degree of intercorrelation shown by the abilities was ·281, the P.E. being ·078.

Factors in pitch differentiation.—An analysis of the replies to the first sixteen questions in Experiments I and II affords an interesting indication of the limitations of the normal untrained or partially trained ability to educe relations of crude pitch difference. Each of these sixteen questions merely asked whether two notes, heard in immediate succession, were thought to be a repetition of the same note, or to consist of two differently pitched sounds. Of the eighty-three testees who took part in these two experiments, twenty-four answered these sixteen questions correctly. The errors of the remaining fifty-nine were distributed as follows :

No. 14, a high semitone	51 times.
No. 6, a high tone	30 ,,
No. 11, a low semitone	27 ,,
No. 12, a low semitone	25 ,,
No. 8, a semitone, normal vocal range	22 ,,
No. 5, a tone, normal vocal range	16 ,,
No. 9, a major third, normal vocal range	12 ,,
No. 13, the same note repeated, low	10 ,,
No. 15, an octave, normal vocal range	7 ,,
No. 10, a major sixth, low	6 ,,
No. 16, a perfect twelfth, low	5 ,,
No. 2, an augmented octave (13 semitones)	1 ,,
Nos. 3, 7, and 1, same note	1 ,,
No. 4, minor sixth, normal vocal range	1 ,,

There seem to be three main factors which tend to modify the purely cognitive process of the eduction of the relation of pitch difference between sounds not otherwise differentiated ; (1) the degree or amount of the difference ; (2) the " height " or " depth " of the sounds heard as compared with the normal vocal standard ; and (3) the natural harmonic relation existing between the sounds heard.

The above analysis of errors seems to suggest that the greatest difficulty is experienced in differentiating sounds which are relatively high or low, as compared with the normal vocal range, the first four places in the list, comprising 133 errors, all being due to the inability to discriminate between sounds just beyond the range of the " treble " and " bass " staves. Again, of these two extremes, there was in this test apparently greater difficulty when the sounds were high than when they were low, but this tendency has not been corroborated by subsequent experiments.

That the amount of difference between the sounds is a factor in the process is apparent from the fact that the first six places in the list, comprising 171 errors and 79 per cent of the total errors, were due to the inability to differentiate between sounds a tone or a semitone apart.

A remarkable illustration of the third factor is the inability of five testees to answer No. 16 correctly, regarding so extended an interval as a perfect twelfth as a repetition of the same note. Excluding the octave the perfect twelfth is the first natural harmonic.

Experiment III.—The test was next submitted, in a modified form, and on two separate occasions, to the third form of a Grammar School, which form consisted of thirty-four boys of an average age of 11.5 years.

The modifications consisted firstly, in the addition, at the first sitting, of a section designed to measure intelligence ; secondly, in the extension of the rhythmic section of the test ; and thirdly, in the omission of a number of the questions from the section on pitch differentiation, to enable the extended test to be carried out at one sitting without undue fatigue.

The Intelligence Test adopted was Spearman's "Measure of Intelligence," because it employs a similar kind of questionnaire, and because it, too, is based on the eduction of relations.

The extended rhythmic series included the addition of a number of "Buzzer" Tests (Test Series B, VIB). The three sections of the rhythm test were further extended on the second occasion the test was submitted, by the addition of similar questions in each section, and to include the extended tests in the time available, the intelligence test was on this occasion omitted.

The reliability coefficients were as follows :

Pitch (i, ii)	$=\cdot 81 \pm \cdot 043$	Metronome (i, ii)	$=\cdot 74 \pm \cdot 056$
Buzzer (i, ii)	$=\cdot 80 \pm \cdot 045$	Verse (i, ii)	$=\cdot 70 \pm \cdot 064$

Notwithstanding the different history of this group, the results were identical. The lowest scores were again in rhythmic perception, the mean score being 61·6 per cent, while in pitch differentiation it was 80·8 per cent. The mean score in the intelligence test was 77·9 per cent. The median scores in each case closely approximated to the mean.

The results showed an even greater individual variation, the scores ranging in the rhythm section from 5·8 per cent to 82·3 per cent, in the section on pitch from 51·9 per cent to 96·1 per cent, and in the "g" test from 47·6 per cent to 100 per cent,

The correlations were as under :

TABLE I.

	Pitch.	*Rhythm.*	*"g."*	*Reliability Coefficients.*	
Pitch	·	·32 ± ·106	·39 ± ·098	Pitch (i and ii).	Rhythm (i and ii).
Rhythm ..	·32	·	·37 ± ·102		
"g"	·39	·37	·	·81 ± ·043	·74 ± ·053

TABLE II.

	Metronome.	*Buzzer.*	*Verse.*	*Reliability Coefficients.*	
Metronome ..	·	·13 ± ·088	·16 ± ·087	Metronome (i and ii).	·74 ± ·056
Buzzer ..	·13	·	·24 ± ·084	Buzzer (i and ii).	·80 ± ·045
Verse	·16	·24	·	Verse (i and ii).	·70 ± ·064

Though low, the correlations shown in Table I between " g " and the processes of educing both pitch and rhythm differences suggest that these processes are dependent at least in part on the general factor in intelligence, and that efficiency in one process essential in " musical ability " does not assume equal efficiency in another fundamental process equally essential.

Table II suggests, even more definitely, that the ability to educe rhythmic pattern is itself not a unitarily functioning process, that there is no " rhythmic ability " which would function equally efficiently, without training, in whatever medium the rhythmic pattern were presented. An analysis of the answers showed, in the buzzer tests, a tendency to regard such triple rhythms as . . _ _ as quadruple, because there were four sounds in the group. The consistency of this tendency in the papers where it appeared at all probably caused the relatively high reliability coefficient in that section of the test which showed the lowest mean score.

GENERAL CONCLUSIONS FROM THE FIRST THREE EXPERIMENTS.

While most of the conclusions drawn from this preliminary group of experiments must necessarily be tentative, and subject to further investigation, the results are not without valuable suggestion.

Firstly, it is obviously unsound to regard musicianship in any form as a unitarily functioning ability. The above results show no appreciable or consistent correlations to exist between even such elementary and fundamental processes as the mere eduction of pitch difference and the perception of rhythmic pattern. Nor is it certain that even these separate abilities are unitarily functioning. The suggestion, prompted by the analysis of the replies to the first sixteen questions, that the eduction of pitch difference is influenced by three attributes of pitch relationship itself, suggests the further possibility that these three factors have varying degrees of influence in different individuals. Of the thirty testees who failed in No. 6 (high tone), twenty-five also failed in No. 14 (high semitone), while only fifteen of them failed in No. 11 (low semitone).

Similarly it has been suggested that the popular conception of an innate rhythmic " sense " is not borne out by experiments on the cognitive process of educing rhythmic pattern.

The second conclusion suggested is the great individual variation shown in each of the abilities within each of the groups of non-selected testees having had similar musical history, the ability varying from an almost absolute inability to a definitely established ability in some section of the tests. This variation exists within each age group, the scores of the testees aged nine varying from 41·8 per cent to 91·1 per cent in the perception of pitch difference, and from 33·3 per cent to 77·7 per cent in that of rhythm ; the scores of those aged ten varied from 43·5 per cent to 99·1 per cent, and from 27·7 per cent to 83·3 per cent respectively, and those of the eleven-year-olds from 43·5 per cent to 100 per cent, and from 27·7 per cent to 94·4 per cent respectively.

Nor is there any apparent relation between the abilities and sex, for notwithstanding the factor that the girls in the above tests had had some training, which served only to raise the mean score, the girls' marks varied from 41·1 per cent to 100 per cent in pitch perception, and from 27·7 per cent to 94·4 per cent in that of rhythm ; while the boys' varied from 43.5 per cent to 99·1 per cent, and from 27·7 per cent to 72·2 per cent respectively. Thus the abilities seem to exist fairly equally in each sex, and to show the same variability in each.*

This factor of individual variatior suggests the inadvisability of general musical education, or at least the necessity of establishing the effect of training, not only on each of the abilities, but also on a relatively poor initial ability. If it can be shown that an initial poverty in either

* C. W. Valentine (*Experimental Psychology of Beauty*, p. 102) finds that men tend to be more sensitive to musical harmonies than do women, a conclusion which seems to be borne out by the extraordinary rarity of great women composers.

of these abilities is but little influenced by training, this factor of individual variation, and the simplicity of the measurement of either ability, once norms were established, would be of considerable value in musical educational practice.

Experiment IV.—Further to test these conclusions, and especially to test the influence of the age factor on the development of these abilities, the test, as submitted in Experiments I and II, with certain modifications, was given to a group of eighty-three testees, varying in age from seven to fourteen years. The testees were boys attending a hospital school, and to avoid the fallacy of selection, as it was impossible conveniently to accommodate many more than this number, two complete "Houses" were submitted to the test.

The tests were re-submitted a few weeks later, for the purpose of obtaining reliability coefficients.

All the testees of eleven years and over had previously taken, in common with the whole school, a series of intelligence tests (Group Tests 34, N.I.I.P.), and the results of these were available for correlation purposes. The boys were, judged by this standard, and in the opinion of the head master, of subnormal intelligence.

The test used in this experiment was modified in three ways. Firstly, the intervals used in Questions 2, 4, 10, and 12, Series A, were changed to the following respectively:



This was done in order to include a low tone, for comparison with No 6, which was the high tone previously found so difficult; a high and a low octave were added, and the alteration to No. 2 was merely a transposition of the dissonant augmented octave, which all but one testee had previously differentiated, to test if this interval should prove more difficult higher.

The second modification consisted in the inclusion of a group of "buzzer" tests in Series B (Test VIB), the previous test having employed only two of the three ways of producing non-melodic rhythmic patterns.

The third modification was the addition of Series C, a group of tests on the recall of auditory experience. This part of the investigation is discussed in Section IV; the complete test is included in the Appendix.

Through the sympathetic co-operation of the head master, who had previously prepared papers, arranged desks, rested the boys, etc., the

conditions of the experiment were ideal, and notwithstanding the difficulties of taking so large a number of testees simultaneously through a group test of this kind, only six papers had to be discarded as being incomplete, through any section of the whole test having been misunderstood or omitted.

General conclusions.—Firstly, the results confirmed the previous suggestion of extreme individual differences in the abilities tested. In pitch differentiation the scores varied from 8·5 per cent to 94 per cent, and in perception of rhythmic pattern from 0 per cent to 65·3 per cent.

This variation was shown in each age group :

TABLE III.

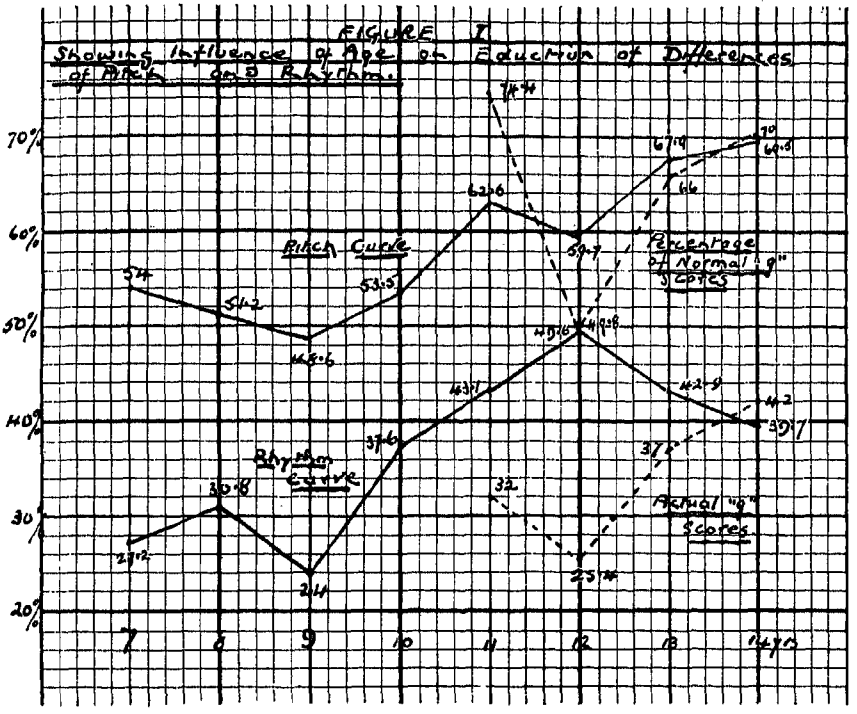
Age.	*Pitch Score.*		*Rhythm Score.*		
	Low.	*High.*	*Low.*	*High.*	
14	32·4%	93·2%	26·9%	61·5%	
13	36·7%	94·0%	11·5%	65·3%	
12	32·4%	88·8%	0·0%	61·5%	
11	22·2%	94·0%	26·9%	57·7%	
10	16·2%	76·0%	15·3%	61·5%	
9	38·4%	74·3%	3·8%	42·5%	
8	8·5%	51·2%	11·5%	46·1%	
7	—	23·0%	—	26·9%	(only one paper.)

The main conclusions were those relating to the influence of age on the development of the abilities. One of the main reasons which prompted the choice of this school for the carrying out of this experiment was the previously ascertained fact that the amount of training in musical ability of any kind received by the boys was negligible, a fact borne out by the low mean scores. This factor in the experiment ensured that any development of the abilities tested would be a normal modification practically uninfluenced by training. The figure shows the curves of the mean scores in pitch differentiation, rhythmic perception, for the ages of seven to fourteen, and of " g " for the ages of eleven to fourteen. The scores for " g " were also calculated as percentages of the norms for each year calculated for secondary schools as given by the N.I.I.P., to show the mean relative intelligence of each age group. The curve showing the modification of the ability to analyse an auditory image is given in Section IV.

Except for the curious drop in rhythmic ability after eleven, both the rhythm and pitch curves show a definite tendency to rise after nine years

FIGURE I.

SHOWING INFLUENCE OF AGE ON EDUCTION OF DIFFERENCES OF PITCH AND RHYTHM.



of age, and the pitch curve shows a remarkable parallelism with the " g " curve. The greater relative intelligence of the eleven-year-olds, who relatively appear to be the most intelligent group, is followed by a sympathetic peak in the pitch curve ; while even more significant is the relatively slight peak at thirteen years, which appears in both the curves.

On the other hand the rhythm curve not only shows a marked depreciation of the ability after twelve years, but also shows obstinately obverse tendencies to the " g " curve ; the highest rhythm point is the lowest intelligence point, the rise at eleven in both pitch and " g " curves is balanced by a slight depression in the rhythm curve, while the steepest rise in the " g " curve occurs when the rhythm curve is falling.

While it is of course unscientific to assume from these results that there is any general tendency for rhythmic ability to depreciate during adolescence amongst boys or girls or both, the suggestion is sufficiently interesting, and if established would be of sufficient importance to musical education to justify further investigation, and would not be an altogether unintelligible tendency. It has long been established that the adolescent is relatively clumsy, especially in matters involving motor co-ordination. There are child dancers and adult dancers, but a boy dancer of fourteen would seem rather an unnatural phenomenon. In *The Psychology of Beauty* Valentine writes, "The feeling for rhythm is evidently very fundamental. Little children love rhythmic sounds and noises." The use of the word "little" seems suggestive. It is at least possible that this apparent awkwardness is not entirely due to weaker co-ordinations or to increased self-consciousness. Moreover, the period of the nursery rhyme with its possible rhythmic influence is past.

Another conclusion already suggested by the previous experiments, and unmistakably confirmed by this experiment, is the relative poverty of this rhythmic ability compared with that of educing pitch differentia. There seems indubitable confirmation of the suggestion made earlier, that however general may be any tendencies to react physically or affectively to regularly repeated sounds (cf. Gilman), such tendencies are normally vague and ill-defined reactions, and that the cognitive ability to detect the simplest rhythmic pattern with sufficient accuracy to justify its inclusion as an element in musical ability is relatively rare in the untrained subject. This general vagueness is further illustrated by the results of an experiment by Valentine* who found that testees tended to regard an irregularly accented series of sounds temporally equidistant as constituting a regularly constructed rhythmic series.

The apparent sympathy between the pitch differentiation and intelligence curves is further emphasized by the relatively high correlation shown in this experiment between these two abilities. The coefficient was ·53 with a P.E. of ·073†. While it is impossible to avoid the suggestion that the actual process of eduction of crude pitch difference is a manifestation of "g," like the eduction of any relation is claimed to be, that the ability is limited by specific and physical factors is confirmed by an analysis of the first sixteen questions, similar to that undertaken after the previous experiments. Excluding the questions where the same note was repeated (Nos. 1, 3, 7, and 13), the following analysis shows the intervals in the

* *The Experimental Psychology of Beauty*, p. 120.
† After partialling-out age.

order in which it was found to be most difficult to educe a relation of difference:

Nos. 10 and 11, a low tone and semitone	..	36 times wrong.
No. 14, a high semitone	33	,, ,,
No. 6, a high tone	29	,, ,,
No. 2, a high augmented octave	28	,, ,,
No. 5, a tone in normal vocal range	26	,, ,,
No. 9, a major third in normal vocal range ..	15	,, ,,
No. 8, a semitone in normal vocal range ..	11	,, ,,
No. 12, a low octave	10	,, ,,
No. 15, an octave in normal vocal range ..	7	,, ,,
No. 4, a high octave	6	,, ,,
No. 16, a perfect twelfth	6	,, ,,

Save that the lower intervals of a tone and semitone were found rather more difficult than the higher ones, whereas before it was the reverse, and taking into consideration the alterations such as the addition of the low tone, the order of the intervals is remarkably similar, and confirms the previous suggestion of the factors which seem to influence the process of pitch differentiation. The transposition of the augmented octave, which when in normal vocal range had, in the previous test, baffled only one testee, now baffled twenty-eight.

Before attempting further to summarize the results of this experiment it is necessary to examine first the results of the third section of the test, that on the recall of musical experience.

IV.—THE RECALL OF AUDITORY EXPERIENCE.

The experiments discussed in Section III investigate only the abilities to educe pitch and rhythmic relations at the time of the experience. While both these abilities or groups of abilities must be regarded as fundamental elements in the compound "musical ability," they alone cannot constitute musical ability even in its simplest form. No "meaning" can be read into any musical experience, however able the immediate eductive process, unless the educed differences may be measured and "judged," "re-cognized," by relating them to previous recallable experience. In music, as in every other cognitive process, to change the process of perception into one of conception involves the ability to recall relevant experiences from the past, with sufficient clearness, definition, and accuracy to make the new experience intelligible.

As musical education, therefore, involves both the abilities accurately to perceive and to recall auditory experiences, this section of

the investigation was undertaken to test the ability to recall an auditory experience with sufficient clarity and definition to enable the testee to analyse it as a necessary preliminary to the further investigation of the trainability of the processes involved in musical ability.

Experiment IV, Section C.—In this experiment, the difficulty of ensuring that the testee could answer questions only by appealing to a recalled musical experience for information, was overcome in that section of the test which dealt with the recall of an auditory experience heard immediately before, by varying the form of question so that a testee, while listening to the example played, was unaware of the nature of the question he would be asked. The complete test, Series C, is appended. It was given to the same eighty-three testees who had taken Experiment IV, Series A and B (see above).

Results.—As the questions involved the same abilities as those tested in the previous sections, the results inevitably showed the same individual variation, the scores varying from 4·34 per cent to 82·6 per cent. Again the variability was shown within each age group, the highest score at eight years being 3·6 times the lowest score at thirteen, showing the ability to exist in a definite form at a very early age.

TABLE IV.

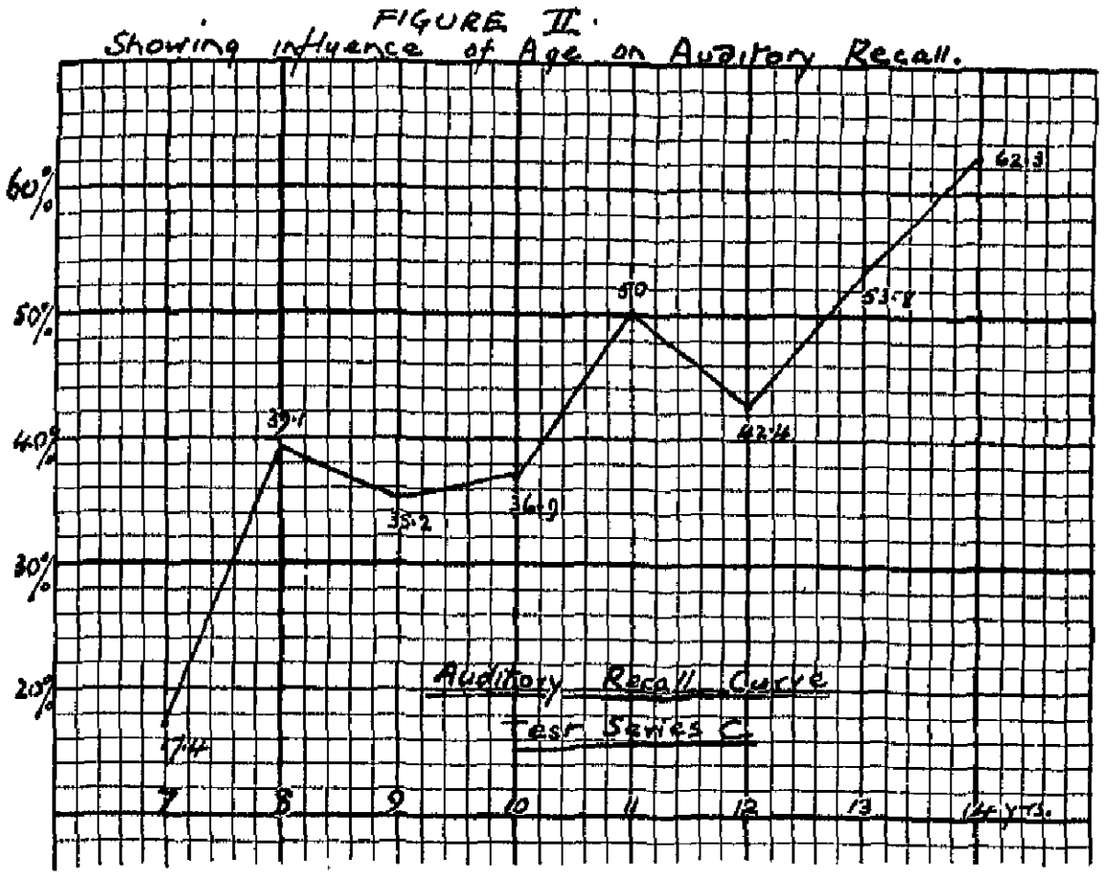
SHOWING AGE GROUP VARIATION IN RECALL SCORES.

Age.	*Lowest.*	*Highest.*
14	56·5%	69·6%
13	13·0%	82·6%
12	13·0%	65·2%
11	21·7%	78·2%

Age.	*Lowest.*	*Highest.*	
10	21·7%	69·6%	
9	4·3%	60·8%	
8	8·6%	47·8%	
7	—	17·3%	(one paper only.)

The curve of the mean scores for each age group shows a still greater and more consistent tendency to rise than did the curves of immediate perception. As the methods of analysing the image involved the same cognitive processes, the same peaks occur. The extreme poverty of the ability at seven, contrasted with previous curves, and the steep rise from twelve to fourteen, especially remembering the performances of the same groups in the other sections of the experiment, suggest that age is an important factor in the wealth and definition of auditory recall, and that the adolescent, to compensate for his apparent poverty in rhythmic ability, is developing the ability to recall and analyse his experiences. The naturally subjective tendencies of the adolescent, his curiosity as to the nature of his newly discovered self-consciousness, would seem to

justify the findings of this experiment, a fact which would obviously have, if established, considerable importance not only in musical education but in education generally.



V.—INTERCORRELATIONS AND GENERAL CONCLUSIONS.

The correlations between the three abilities tested in Experiment IV, and "g," as previously tested, after partialling out age, were as under:

TABLE V.

	Pitch.	*Rhythm.*	*Recall.*	"*g*."
Pitch	.	·22 ± ·005	·36 ± ·088	·53 ± ·073
Rhythm ..	·22	.	·14 ± ·079	·46 ± ·080
Recall ..	·36	·14	.	·04 ± ·100
"g"	·53	·46	·04	.

Reliability Coefficients.

	Pitch (*i*, *ii*).	*Rhythm* (*i*, *ii*).	*Recall* (*i*, *ii*).	
	·88 ± ·021	·77 ± ·041	·73 ± ·047	

The high correlation between pitch differentiation and "g" seems to leave little room for doubt that the eduction of pitch difference not only involves "g," as is suggested by Burt*, Spearman†, and others, but, limited only by the specific factors above noted, is little more than a manifestation of general ability, or, to use the technicology of this school, is saturated with "g."

Similarly, the correlation of ·46, exhibited between the scores gained *in the rhythm tests and "g," is equally significant.* While both these processes, therefore, involve the general factor, their own intercorrelations have been, throughout these experiments, consistently low. Nor, as might be expected, does the application of the tetrad criterion to Table V lead to the production of any significant tetrad difference. The differences from the three equations available are ·0654, ·0914, ·1568.

The low correlations again shown to exist between the scores of the various rhythm tests corroborate the conclusions suggested by Experiment III. For the purpose of applying the tetrad criterion, these scores were correlated with those of the "g" test, and with those of the pitch discrimination test, as the latter ability had appeared most definitely to involve "g." Age was partialled out.

TABLE VI.

	Metronome.	*Buzzer.*	*Verse.*	"*g*."	*Pitch.*
Metronome ..	·	·27 ± ·087	·03 ± ·097	·60 ± ·065	·51 ± ·075
Buzzer.. ..	·27	·	·06 ± ·091	− ·19 ± ·098	− ·03 ± ·087
Verse	·03	·06	·	·14 ± ·099	·14 ± ·099
"g"	·60	− ·19	·14	·	·53 ± ·073
Pitch	·51	− ·03	·14	·53	·

Reliability Coefficients.

Metronome (*i and ii*).	*Buzzer.* (*i and ii*).	*Verse* (*i and ii*).	*Pitch* (*i and ii*).
·77 ± ·042	·70 ± ·053	·72 ± ·049	·88 ± ·021

The fifteen tetrad equations available from the above table were worked out. In no case was there any significant tetrad difference, the mean difference being ·037, from which the mean deviation was ·018; the highest difference was ·13. As was noted in a previous section, these

* *B.J.P.*, 1909, III.
† *Abilities of Man*, p. 184.

tests on rhythm bear a similar relation to the " temporal relation " as those various form-board tests which involve pattern bear to the "spatial relation." But while there has been considerable work with the latter group, there has been astonishingly little with the time relation.* These results bear out the results of the spatial relation tests, that there is no specific ability to detect rhythmic pattern.

I have since tested a boy aged 5.6 years, of considerable intelligence (I.Q. 120), and who seemed to have the so-called rhythmic sense in that he could march to time, modifying his pace to the music, and generally exhibiting pleasure in rhythmic tunes. He was first given a form-board consisting of twenty coloured pieces, which were to be fitted into a box in accordance with a number of given patterns, all of a symmetrical nature. His interest was stimulated by the rather immoral procedure of the offer of material reward for success. He seemed to find the apparently simple process very difficult, adopting trial and error methods, and in spite of ultimate success, he never seemed to realize the design as a whole. The testee was later asked to " beat time " by a simple " up-and-down " movement, to a tune in well-marked duple time, having an exaggerated accent on the first beat of every bar. Even after he had learned to do this successfully, the child would cease to beat on a sustained note, and, during a series of half-beats, would vaguely increase his pace, and find it impossible to regain the rhythm. When three beats were used, with equally exaggerated accents on the first beats, he seemed to detect no difference between that and the duple rhythm.

The conclusion seems to be reinforced that it is fallacious to assume that any tendency physically or affectively to react to regularly repeated sounds necessarily implies the existence of any innate and unitarily functioning ability other than that of general intelligence to educe temporal relations and rhythmic design, and emphasizes in musical education the necessity of definitely developing and training the cognitive processes involved.

Apart from the very definite indication that the ability to recall auditory experience with sufficient clearness for the eduction of relations between their several parts does exist at a very early age; that it shows fairly consistent development in general but remains dormant in particular cases; and that its most rapid development seems to be during adolescence, it is difficult to say more from this investigation. Nevertheless, one can hardly avoid the tentative suggestion that the lack of any significant correlation shown between the scores gained in the recall tests and " g "

* Spearman (*Abilities of Man*, p. 227): " Passing to the relation of time there is nothing to say, for nobody seems to have provided the necessary correlations."

indicates that the ability to recall the experience, apart from the ability to analyse it, does not seem to depend to any appreciable extent on intelligence.

The cognitive processes involved in the recall of musical experience form the subject of the next section of this investigation. There seems little doubt, however, that the testees in the above tests had to rely to a considerable extent on imagery. The tests were so devised that the testee was unaware at the time of the experience of the nature of the questions to be asked, and therefore in most cases would have to recall the tune itself in order to answer the question. That the tune was so recalled is borne out by the testees' introspections, which were invited when the test was re-submitted. In answer to the question " How did you find the answers to the questions?" an actual and typical reply was, "I heard the tune singing in my head." If it is so, that these tests on recall were virtually tests involving auditory imagery as an essential element in the process, the results would confirm Miss Carey's conclusion that " imagery tends to show inverse correlations with processes involving " g."*

VI.—Summary of results and conclusions.

(1) Musical ability necessarily includes a complex group of cognitive processes which show but little tendency to significant positive correlation.

(2) The eduction of pitch difference tends to show high correlations with "g." It appears to be influenced by at least three specific factors which are attributes of the pitch relation itself: (i) the degree or amount of the difference; (ii) the " height " or " depth " of the interval from the normal vocal range; and (iii) the natural " harmonic " relation between the sounds heard.

(3) Rhythmic perception shows positive but lower correlations with " g." There is apparently considerably greater difficulty in deducing rhythmic pattern than in pitch differentiation in most cases. Metronomic, buzzer, and verse tests, which illustrate the three possible ways of forming rhythmic pattern (see Section II), show low intercorrelations.

(4) Very marked individual variation characterizes the possession of both these abilities, and the correlations between them are consistently low. There is little evidence that there is any factor common to both abilities other than the general factor in intelligence.

(5) Age is an important factor in the development of both abilities, the curves tending to show a remarkable parallelism to the intelligence

* *B.J.P.*, VII, p. 489.

curve, except that the curve showing appreciation of rhythmic pattern apparently tends to fall during adolescence.

(6) The ability to recall musical experience with sufficient clearness for analysis undoubtedly exists at a very early age, but shows most definite and rapid development during adolescence. The ability to recall the experience apart from the ability to analyse shows no significant correlations with "g."

(7) While the suggestion emerged from the tests that the processes involved tend to react to training, this possibility, and the more complete analysis of the processes involved in the recall of musical experience, are now being investigated.

APPENDIX.

SYNOPSIS OF TESTS, SERIES A, B, AND C.

(Owing to the limitation of space the publication of the complete tests is reserved for the next number.)

TEST SERIES A.—EDUCTION OF PITCH DIFFERENCE.

TEST I: Nos. 1 to 16.—The subjects, provided with prepared and numbered papers, were asked to judge whether two notes sounded in succession by the tester were two differently pitched sounds or a repetition of the same note. The sixteen intervals employed are analysed on page 187.

TEST II: Nos. 17 to 27.—The subjects were asked to state which two of a series of three notes were of the same pitch.

TEST III: Nos. 28 to 36.—Employed a series of four notes of which two were alike.

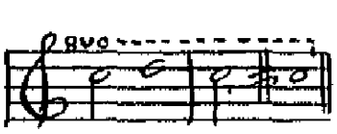
TEST IV: CONCEPT OF "HIGH" AND "LOW."—An ascending scale of C major was played, and the testees told that "sounds played in that order" are said to "go up." This was repeated. The descending scale was then played, with similar instruction.

Nos. 37 to 45 consisted of groups of three notes successively sounded, the subjects being asked to state whether they thought the little tunes went "up" or "down."

Nos. 46 to 50.—Two notes only were sounded, and the subjects asked which of them was the higher.

TEST VA: INTERVALS BETWEEN SOUNDS HEARD IN SUCCESSION.—The subjects were asked to listen to two notes heard in succession and described as being "close together," and then to two "farther apart." Another example was given.

In Nos. 51 to 60 the subjects were asked to state which of two pairs of notes was the farther apart. The difference between the two intervals contrasted was varied

from  to 

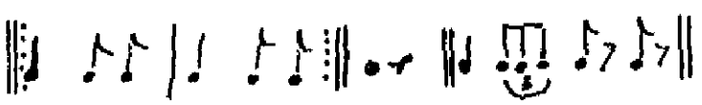
TEST VB: INTERVALS BETWEEN SOUNDS HEARD TOGETHER.—Nos. 61 to 70. This was a similar test, save that the intervals contrasted were presented as chords, thus:



TEST SERIES B.—EDUCTION OF RHYTHMIC PATTERN.

TEST VIA: METRONOME AND TAPPING.—Nos. 71 to 81. Each number consisted in the repetition, for ten "bars," of a simple rhythmic pattern, produced by *the periodic accentuation of a regularly recurring sound in a temporarily* regular series of sounds. After listening to a brief explanation and metronomic illustration of "ticks" and "beats," the subjects were asked to state whether a given series was in groups of two, three, or four beats. In order to introduce alternate groups of two and three, and irregular groups, tapping replaced the metronome at No. 76. The beats were mechanically timed.

TEST VIB: BUZZER. Nos. 82 to 89.—Rhythmic patterns were presented in series of sounds of equal intensity but differing in temporal relation, thus:



TEST VII: RHYTHMIC WORD GROUPS. Nos. 90 to 96.—Accented rhythmic verse was used for the presentation of the rhythmic pattern. The subjects were asked which kind of "beating," two, three, or four, would best suit each example.

TEST SERIES C.—AUDITORY RECALL TESTS.

TEST VIII: IMMEDIATE RECALL. Nos. 97 to 117.—Rhythmic melodies were played, varying in length

from  to 

The subjects were merely asked to listen to the tune as it was being played. After each example they were asked questions about the tune they had heard, but they were unaware during the playing of each example of the nature of the questions they were to be asked. Typical questions were: How many notes were there in the tune? How many notes at the beginning were the same? Did the last two notes go up or down, or were they the same? Was it in two, three, or four beats?

TEST IX: REMOTE RECALL. Nos. 118 to 124.—Similar questions were asked, but relating to tunes with which the children would normally be expected to be acquainted, but which they had not heard in connection with the test. Tunes used in this test were the National Anthem and the tune to "While Shepherds Watched."

RÉSUMÉ.

DES RECHERCHES SUR L'ANALYSE DES PROCESSUS PERCEPTIFS IMPLIQUÉS DANS LES APTITUDES MUSICALES ET L'EDUCATION MUSICALE.

L'éducation musicale souffre à cause du manque de tout concept généralement accepté, de ce qui constitue l'aptitude musicale. De nécessité compliquée, l'aptitude musicale comprend des processus perceptifs qui montrent des corrélations positives et significatives avec " g," mais peu de tendances à des interrélations positives.

La sensibilité différentielle à la hauteur tonale semble très définitivement dépendre de l'intelligence générale, en tenant compte toujours des facteurs spécifiques qui sont des attributs des relations de hauteur en elles-mêmes.

La perception de rythme semble, d'ordinaire, offrir plus de difficultés, et varie selon le médium dans lequel on présente la forme rythmique.

Tandis que ces aptitudes montrent des variations considérables à chaque âge où l'on les a analysées, l'âge est un facteur important dans leur développement général. D'après ces recherches l'aptitude à distinguer les rythmes montre une tendance définitive à altérer pendant l'adolescence.

De l'autre côté, l'aptitude à évoquer une expérience musicale avec assez de netteté pour l'analyser, tout en appraraissant, dès un âge très bas, montre le développement le plus rapide pendant l'adolescence.

On est en train de poursuivre d'autres recherches, au sujet des facteurs impliqués dans l'évocation d'une expérience musicale et de la possibilité de développer les processus perceptifs impliqués dans l'aptitude musicale.

ÜBERSICHT.

VERSUCHE ÜBER DIE ANALYSE DER MIT MUSIKALISCHER VERANLAGUNG UND MIT MUSIKALISCHER ERZIEHUNG ENG VERBUNDENEN ERKENNUNGSVERFAHREN.

Musikalische Erziehung hat unter dem Mangel an einem allgemein gebilligten Begriff der musikalischen Fähigkeit gelitten. Musikalische Fähigkeit, die notwendigerweise kompliziert ist, begreift in sich Erkennungsverfahren, die positive und bedeutende Korrelationen mit „ g," aber wenig Hang zu positiven Interkorrelationen aufweisen.

Tonunterscheidung scheint ganz bestimmt von allgemeiner Intelligenz abzuhangen, abhängig von dem Einfluss spezifischer Faktoren, die Eigenschaften der Tonunterscheidung selbst bilden.

Rhythmische Empfindung scheint allgemein schwieriger zu sein, und ändert sich dem Mittel nach in dem, das rhythmische Muster hergestellt wird.

Während beide Fähigkeiten grosse individuelle Schwankung in jedem Alter aufweisen, das geprüft wird, spielt das Alter eine wichtige Rolle in ihrer allgemeinen Entwicklung. Aus diesen Versuchen geht hervor, dass rhythmische Fähigkeit im Jünglingsalter eine bestimmte Tendenz zu sinken zeigt.

Anderseits weist das Vermögen, sich musikalische Erlebnisse mit genügender Klarheit für Analyse ins Gedächtnis zurückzurufen, auf die schnellste Entwicklung im Jünglingsalter hin.

Weitere Versuche über die im Zurückrufen musikalischen Erlebnisses und die Erziehbarkeit der in musikalischer Fähigkeit begriffenen Erkennungsverfahren werden zur Zeit gemacht.

A COMPARISON OF THE EFFECTS ON RETENTION OF VARIOUS METHODS OF REVISION.

By ERIC EAGLESHAM

(Summarized from a thesis submitted in part fulfilment of the requirements for the degree of Bachelor of Education, University of Edinburgh.)

Contents.

Aim of experiment: to test methods of revision.

I.—*Ability of classes by group intelligence test.*
Selection of equivalent groups by Mental Age and I.Q.
Standardized lessons; revision by three methods.
Test and results.

II.—*Construction and use of equivalent tests.*
Results.

Conclusions.

Teachers and students of education are constantly hearing of novel modes of teaching advocated by various enthusiasts. In Caldwell Cook's *Play Way*, for instance, we have a delightful description of new methods of teaching English, methods which throw continual emphasis on the cultural possibilities of the pupil's own activities.

The teacher reading such books may ask himself whether they have any bearing on his practical problems; whether, for example, the methods described by them could be applied to the learning of hard facts in history or geography. Impressed by the importance of this problem, the writer of the article below set out to investigate the question under carefully controlled conditions.

Aim of experiment.

The aim was to compare the effects on memory of three different methods of revision. To do this it was proposed to give three classes the same series of lessons and then to revise the work done by a different method in each case. A test of the subject-matter would thereafter be applied to evaluate the methods. The first method was an ordinary revision lesson of the work involved; the second, a written composition on that work; and the third revision by "oral composition"—that is, by the children speaking and asking questions among themselves.

PART I.—ABILITY OF CLASSES SELECTED.

First, three classes, A, B, and C, were chosen, which were, as far as possible, alike: in school attainments, in age, and in ability. An Intelligence Test showed that the three classes were fairly similar in mental age, with A rather less advanced than B or C. A had, however, the highest average I.Q., as it was composed of slightly younger children.

Class.	*Average Mental Age.*	*Average I.Q.*
A.	125·3	96·5
B.	129·3	91·6
C.	129·5	93·6

EQUIVALENT GROUPS.

Next the attempt was made to select equivalent groups from these classes—that is, groups with the same ability for the proposed work. The criterion in this first attempt was Mental Age: a measure of ability to answer a group Intelligence Test correctly appeared to be at least a convenient measure of ability for this experiment. For each child in a group of twenty-seven in Class A, I picked a child of as nearly as possible the same ability (M.A.) in C; while a group from Class B was paired off with another from C. Groups B^1 and C^1 were practically equivalent: the average difference in ability and brightness was small. A^1 was, however, considerably brighter than C^1 (it had an average advantage of 5·4 points of I.Q.); yet in Mental Age the groups were practically equivalent. (The C^1 of twenty-five children grouped with B^1 differed slightly from that of twenty-seven children grouped with A^1.)

Group.	*M.A.*	*I.Q.*
A^1	127·0	98·4
C^1	127·4	93·0
B^1	130·8	92·0
C^1	130·7	92·6

PRELIMINARY ORAL TEST ON AUSTRALIA.

The subject matter was to come from the geography of Australia, which none of the classes had so far studied. A simple test was given and its results proved that the classes were almost entirely ignorant of this subject.

The lessons on Australia.

The lessons (four in number) were based on a carefully memorized set of notes, and were the same in each class. Questions were similarly standardized. The material included a description of the position of Australia; a brief historical sketch; the names and positions of mountains, rivers, towns, and industries; with an account of the main climatic regions and the more distinctive Australian animals and plants. On the fifth day for each class the children transcribed from the blackboard a summary of my notes, including all the material which they would afterwards require for the test on Australia, and in all cases the children were instructed to read over their notes at home in preparation for the forthcoming test.

Training in oral composition.

This training occupied two periods, and was given to all three classes. I tried to encourage the children to speak and to answer questions among themselves, both on prescribed and on self-chosen topics (other than Australia).

So far the classes had been treated in identical fashion: the same lessons, at much the same time of day, and after similar intervals; identical notes; and the same training in Oral Composition. The experimental factors were now applied.

Methods of revision.

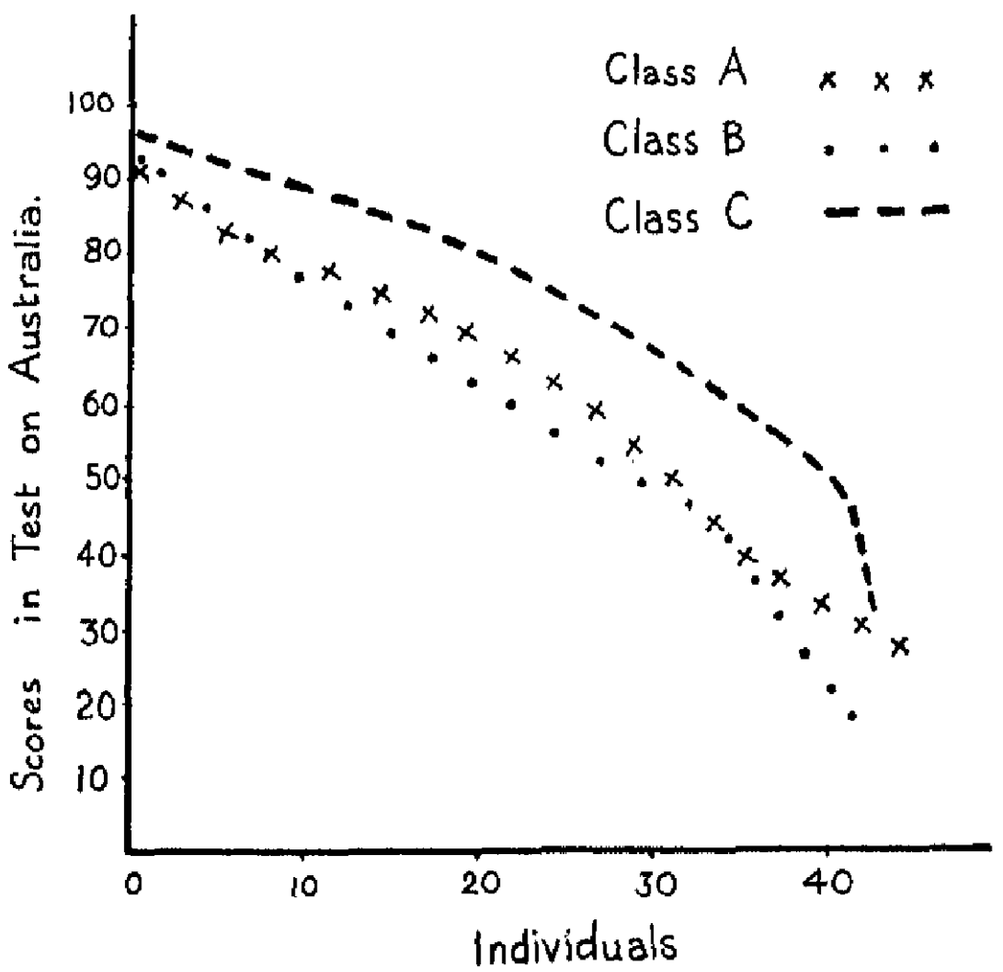
As methods of revision, A was to have a simple Revision Lesson, B Written Composition, and C Oral Composition. In each class the revision period occupied forty minutes. The first method consisted in my going over every point in the notes, showing places on the map, and questioning the class on each point; the second, in the children writing up their notes, using atlases when necessary, and being allowed to consult me; while for the third, seven children gave speeches on the work involved, and were questioned thereon by their classmates. That is the third method following the lines of the course of training in Oral Composition.

It should be noted that these speeches had been prepared at home, but we shall see later that this did not materially affect the results. Each of the seven speakers had been instructed to limit his speech to that part of the notes which dealt with a certain topic, and together these seven topics covered the whole of the work to be revised.

THE TEST ON AUSTRALIA.

I now gave a test on Australia : a test so comprehensive that it covered practically all the subject matter of the lessons, and hence all the work revised. It consisted of 100 items. This test had already been tried out on a fourth class, and had been considerably modified in view of the answers by that class.

It was designed to measure various types of memory. The main constituent was a Missing Word Test, aimed at determining the power of recall. In this the children had to fill in such blanks as : " To the East of Australia is a sea called The —— Ocean." Another part involved recognition. Here the instructions were to underline the correct word in a list of three—e.g. : " Because of the climate the best grass lands lie in the (north, east, west)." A third type gave a list of " Mediterranean " and " Tropical " fruits grown in Australia. Each was to be distinguished by placing an M or a T after it, as Figs (M), Coffee (T). The last part required a similar differentiation between Australian and non-Australian animals.



The test was constructed to have the greatest number of questions of medium difficulty value: such that in the normal class at this stage (Senior 1B) most of the questions would be crucial for the average child. The distribution of difficulty values of items resembled the distribution of ability of the classes for which it was designed. A few very difficult items were suited especially for testing the very clever pupils; a few very easy items for the very dull; and most of the items of such difficulty as to test mainly the ordinary children in the middle of the class.*

RESULTS OF TEST.

(1) *Classes.*

A, which had revised by means of a Revision Lesson, had an average score of 61 per cent; B (Written Composition) an average score of 60 per cent; and C (Oral Composition) an average score of 75 per cent. As B and C were practically equal in mental age and I.Q., C's gain of 15 per cent over B appears significant; but C's gain over A might be due to the former's slightly higher mental age.

(2) *Equivalent Groups (Method I).*

The groups A^1, B^1, and C^1 were practically equal in ability (M.A.), but to effect this equality the children selected for A^1 had to be considerably brighter on the average (since they were younger) than those in C^1 (an average advantage of five units I.Q.). The results showed a gain of 15 per cent for C^1 over B^1, and of 6 per cent for C^1 over A^1. As the probable error of the first difference showed it to be significant, and as B^1 and C^1 were practically equivalent in all respects, the gain for Oral Composition over Written Composition appears to be fairly conclusive. C^1's gain over A^1 is not large enough to justify any conclusion; but the correlation coefficients suggested that the smallness of this gain might be due to A^1's advantage in I.Q.

(3) *Equivalent Groups (Method II).*

The correlation coefficients of scores in the test on Australia with (1) Mental Age, and (2) I.Q., indicated that some account should be taken of brightness as measured by I.Q. (Both had a correlation with the scores of about ·6 to ·7.) When I found this I made new equivalent groups from A and C (A^2 and C^2), making them equivalent in M.A.+ I.Q. For instance, if X's M.A. was one month more than Y's M.A., while

* The result of this fitting of the answer pattern to the curve of ability of the classes is shown in the diagram on p. 207. Note how the scores had an even (linear) scatter throughout each of the three classes.

his I.Q. was one unit less, it was assumed that X and Y had equal ability for this test. When I had finished these groups I found that C^2 was 3·4 months more on the average in M.A. than A^2; but it was four units less in I.Q. C^2 had scored 79 per cent, while A^2 had only scored 64 per cent—a gain of 15 per cent.

It remained to examine the individual scores in C, and it was found that, while speakers had only returned scores such as their ability would have led us to predict, the scores of outstanding questioners, who had not prepared speeches, were considerably higher than one would have expected.

It will be recalled that speakers had prepared their work at home; but an examination of individual scores showed that the gain of the oral composition group was derived from individuals in every part of the class, and could not be ascribed to those who had done extra home preparation. (The diagram on p. 207 illustrates the fact that the differences between the averages for the classes were not due solely to large scores on the part of a few individuals in C, but were derived from the scores of pupils throughout the whole range of ability.)

Below is given a schematic representation of the course of this, the first part, of the experiment.

DIAGRAM SHOWING COURSE OF FIRST PART OF EXPERIMENT.

Classes	*A.*	*B.*	*C.*	*D.*
Number ..	44	41	42	
	INTELLIGENCE TEST.			
	Preliminary Oral Test on Australia.			
	Series of Lessons on Australia.			*Same Series.*
	Revision by			
	Lesson (A).	*Written Composition (B).*	*Oral Composition (C).*	*Test on Australia (Form 1).*
	Test on Australia (Form 2).			
Results.. ..	A .. 61% A^1 .. 67·3% A^2 .. 63·7%	B .. 60% B^1 .. 58·8%	C .. 75% C^1 .. 73·0% C^1 .. 74·1% C^2 .. 79·0%	

A, B, C.—The three classes for the experiment, approximately equal in important factors, as mental age, I.Q., etc.

A^1, B^1, C^1.—Three groups, within the classes, chosen to be almost exactly equivalent in M.A., child by child. (The group C^1 of twenty-seven children compared with A^1 differed slightly from the group C^1 of twenty-five children compared with B^1).

A^2, C^2.—Other equivalent groups of thirty, chosen (Method II) to be equal in M.A. plus I.Q. (including, of course, a number of children also chosen for A^1 and C^1).

D.—A fourth class for trying out both the series of lessons and the Test on Australia, of which Form 2 embodies the improvements thereby suggested.

Method II, it will be seen, assumes that the older child, as such, was at a disadvantage. The actual correlations between Chronological Age and Score in Test on Australia for *Mental Age constant* were:

Class.	$r_{CA\ S.M}$
A.	−·366
B.	−·206
C.	−·058

Part II.—Comparison of Revision Lesson Method and Oral Composition Method by Equivalent Tests.

Diagram showing course of second part of experiment.

Class E of 46 Children.	
Intelligence Test for comparative purposes.	
Same Series of Lessons on Australia.	
One half of work, X, revised by Oral Composition.	*Other half of work, Y, revised by a Review Lesson.*
Test (Form 3), in which the 34 X^1 items were known by previous experiment to be equal in difficulty value to the 34 Y^1 items, each to each.	
Average Score in Part X^1. 22·7	Average Score in Part Y^1. 21·2
Difference .. 1·5±1·01.	

The test on Australia.

The essential feature of this part of the experiment was the use of a test (Form 3) composed of two equivalent parts (X^1 and Y^1). These were constructed by splitting the old test on Australia (Form 2), consisting of 100 items, into two parts such that each item in X^1 had an item in Y^1 equivalent to it (of the same difficulty value).

Difficulty values were calculated from the percentage of correct answers to each item in 120 copies of the test already used (percentages were converted into P.E. units of difficulty). A considerable number of items had to be rejected and X^1 and Y^1 finally comprised thirty-four items each.*

TRAINING AND REVISION.

Only one class (E) was required. It was taught the same series of lessons on Australia as Classes A, B, and C; with the sole modification that a number of items not to be included in this test were omitted. In revision, that half of the work covered by Text X^1 was revised by the children taking part in Oral Composition on Australia. As in the previous part of the experiment, each child spoke on a particular part of the work; but this time the portion on which he had to speak was necessarily more strictly prescribed. As before, the children had been given notes, and each speaker was restricted to a particular part of these, and was questioned by the class on that part. Each of five speakers was allowed a total time of four minutes.

That same day I gave a revision lesson on the other part of the work (Y), and questioned the class on it. My entire lesson occupied twenty minutes. The time was allotted as below:

Division of Period.	*Time: Mins.*	*Form of Revision.*
I	10	Lesson and questioning by me on first half of X.
II	20	Oral Composition by five children on Y (questioning by class).
III	10	Lesson and questioning by me on second half of X.

As in Part I of the experiment, the Revision Lesson was strictly limited to matter relevant to the test, and covered all the work to be tested by X^1; while the method of allocation of topics to speakers ensured

*The arithmetical mean difference in difficulty value between items in X^1 and equivalent items in Y^1 was very small (·03 P.E. units), while the algebraical mean difference was nil. There were 18 cases of perfect equivalence (same percentage correct answers, and same P.E. difficulty value), 12 cases of ·05 difference in P.E. difficulty value, and 4 cases of ·1 difference in P.E. difficulty value.

that they would cover most of the work to be tested by Y^1. As a matter of fact, they covered practically all that work, and questions from the class elicited information about the remainder.

The test.

The test on Australia (Form 3) was given to the entire class on the following day. In this, paragraphs of X^1 alternated with paragraphs from Y^1 (the method adopted in selecting equivalent items was such that no drastic rearrangement of items in Form 2 was necessary).

Now, since X^1 and Y^1 had the same difficulty value it was only necessary to compare the scores in X^1 with those in Y^1 to find the relative merits of the two methods of revision.

Results.

Thus measured, the average gain in score units for Oral Composition (X) over the Revision Lesson (Y) was 1·5 (4·4 per cent). But this difference could not be considered significant (probable error of difference, 1·0).

	Part of Test Revised by Oral Composition.	*Part of Test Revised by Revision Lesson.*
Average Score ..	22·7	21·2
Score as %	66·8%	62·4%

Taken by itself, this result allows us to conclude that such a method of revision by Oral Composition seems to be quite as good as such a Revision Lesson. It may, however, be held to corroborate to some slight extent the results for Part I. The more rigid discipline in the class used in Part II was less favourable to the practice of Oral Composition—a fact which probably rendered the gain smaller.

Reliability.—A measure of the reliability of results for Part II was found by correlating the difficulty values of the same items in Parts I and II of the experiment. The coefficients were lower than had been hoped:

Y^1 Items .. $r_{\text{p.e.}_1,\ \text{p.e.}_2} = \cdot 61$ (p.e. ·07)

X^1 ,, .. $r_{\text{p.e.}_1,\ \text{p.e.}_2} = \cdot 57$ (p.e. ·08)

These low coefficients may be partly attributed to the lapse of time (six months) between the teaching of lessons in Part I and that in Part II.

The correlation between scores in X^1 and scores in Y^1, on the other hand, was ·84, which, by the Spearman-Brown formula $2r/1+r$, gives a reliability coefficient for the whole test of ·91.

CONCLUSIONS.

Oral Composition has at least held its own as a method of revision. The gain over Written Composition was decided, both for the classes and for the equated groups. Compared with the Revision Lesson, the difference again favoured Oral Composition, whether judged by the scores in the classes, the groups or the equivalent tests, although only the differences between the classes and between the groups formed using the second method could by themselves be held to be significant.

In closing, the writer would gratefully acknowledge his indebtedness to Professor G. H. Thomson, of Edinburgh University, for much invaluable assistance and constructive criticism.

RÉSUMÉ.

UNE ÉTUDE DE L'EFFET SUR LA FIXATION MNÉMONIQUE DE DIVERSES MÉTHODES DE REPASSER UNE LEÇON.

Cette expérience a comparé trois procédés différents, employés pour repasser une leçon de géographie; une leçon de revision donnée par le professeur, une revision au moyen de notes rédigées par les élèves et une revision au moyen de conférences faites par les élèves et de questions qu'ils se posent l'un à l'autre, c'est à dire, la revision par la composition orale.

Dans la Partie I cette comparaison fut effectuée par la formation de groupes équivalents. Le degré de fixation mnémonique du travail repassé fut mesurée par un " test " soigneusement construit : le travail accompli et le test employé étaient, bien entendu, identiques pour les trois classes. Les résultats démontrèrent que la composition orale était sensiblement plus efficace que la rédaction de notes, et un peu plus efficace que la leçon, les moyennes étant respectivement 74, 59 et 67.

Dans la Partie II le travail d'une seule classe fut repassé, l'une moitié par la composition orale, l'autre par une leçon du professeur. Deux tests équivalents, arrangés de facon à ce que leurs item s'égalaient quant à la difficulté, furent employés pour comparer l'efficacité des deux procédés. De nouveau la différence, quoique légère, penchait en faveur du premier procédé. Moyennes 67, 62.

ÜBERSICHT.

EIN VERGLEICH DER WIRKUNGEN VON VERSCHIEDENEN REVISIONSMETHODEN AUF DIE GEDÄCHTNISKRAFT.

Dieser Versuch verglich drei verschiedene Revisionsmethoden für Geographie, Revision durch eine vom Lehrer gegebene Stunde, Revision durch Notizen, die von den Kindern gemacht wurden, und Revision durch kleine Vorträge und Fragen unter den Kindern selbst—d.h. Revision durch mündliche Komposition.

Im ersten Teil wurde dieser Versuch vermittelst äquivalenter Gruppen bewerkstelligt. Erinnerung an die revidierte Arbeit wurde durch eine sorgfältig erdachte Prüfung gemessen; die getane Arbeit und die benutzte Prüfung waren allerdings gleich für alle drei Klassen. Die Ergebnisse wiesen darauf hin, dass mündliche Komposition erheblich wirkungsvoller ist als Notizen; und ein wenig wirkungsvoller als die Revisionsstunde. Durchschnitt im betreffenden Falle war 74, 59 und 67.

Im zweiten Teil wurde die Arbeit einer einzelnen Klasse revidiert, die eine Hälfte durch mündliche Komposition, und die andere Hälfte durch eine vom Lehrer gegebene Stunde. Zwei gleichwertige Prüfungen, die durch auf Grund der Schwierigkeit ausgeglichene Einzelheiten gemacht wurden, benutzte man, um die Wirkungsfähigkeit der beiden Methoden zu vergleichen. Ferner entdeckte man, dass der Unterschied, obwohl gering, sich zugunsten jener Methode zeigte.

THE PRIMARY SCHOOL.

[Report of the Consultative Committee of the Board of Education. London, H.M. Stationery Office, 1930. Pp. xxix + 290. 2s. 6d. net.]

It has been said that this report is "less revolutionary" than *The Education of the Adolescent*. That may be true in certain respects. There are no far-reaching administrative changes involved in its recommendations. There is little in it that has not been heard of by the really progressive teacher, and nothing essentially new to the psychologist. And yet I feel that in many ways it marks a clearer step forward in its own field, and a more radical change in educational outlook.

Education in the years between seven and eleven had long been relatively stagnant. The waters had been stirred far more often for adolescents. A host of agencies had kept our social and educational consciences sensitive in that direction, and the initiation ceremonies of the school-leaving age had compelled our attention to the crises of adolescence, however grudgingly we gave it. The Day Continuation School movement, though abortive, had nevertheless already done much to enliven our notions and prepare us for serious effort.

But children between the infants' school and the pubertal years had no such dramatic claim upon our attention. They offered no social and economic crises to focus our eyes, and no outstanding changes in personal development. On the one hand, the school had not to meet any immediate demand from the outside world in these years, and so was not driven to conceive its work in terms of the immediate needs of its pupils in actual life. Its task was simply to lay a "groundwork" upon which an edifice might or might not be built in the upper standards or the secondary school. It was to sow only that others might reap. And on the other hand, the children themselves did little to compel direct understanding, since in these years their growth goes on so quietly and undramatically. The open challenge of adolescence has not to be met here.

And so it was possible for the middle and lower standards of the elementary school to remain more cloistered and ridden by routine than any other part of the educational system. They were, of course, touched by new ideas here and there. Some schools were alive with fresh inspiration even in the junior standards, and much excellent work was being done. But speaking comparatively and in general terms, the "primary" school was the Cinderella of reform.

It may be that the report contains nothing revolutionary in idea to educational leaders and thoughtful teachers. It *is* a revolution to have a high official body, one whose voice will reverberate in every classroom, say decisively that "a good school is not a place of compulsory instruction, but a community of old and young, engaged in learning by co-operative experiment;" that "the curriculum is to be thought of in terms of activity and experience rather than of knowledge to be acquired and facts to be stored;" that "our main care must be to supply children between the ages of seven and eleven with what is essential to their healthy growth—physical, intellectual, and moral—during that particular stage of their development"; and that the primary school "will best serve their future by a single-minded devotion to their needs in the present."

Such views are not new; but when persuasively stated by the Consultative Committee, they will strengthen the weak-kneed, give heart to the timid, and stir up the slothful to new vision. The report may usher in a day of new life for the mass of children between seven and eleven years of age.

The main recommendations of the Committee embody in practical detail its psycho-biological approach to the task of education. The report shows clearly that one of the first essentials in the primary school problem is an adequate classification of the children on the basis of their "natural gifts and abilities." Only so can the needs of the retarded, the ordinary and the brighter children be adequately met. The chapter on retarded children is an extremely useful short survey of the problem. Both the retarded and the more gifted groups are held to present a special technical problem, calling for much further research and experiment in method. The question of classification thus underlies those of the curriculum and of methods of teaching.

With regard to the broad difference between "individual" methods and class teaching, the Committee wisely sees that it is not a matter of choosing between them, but of using each in its appropriate setting. Each has its place and function. A passage on this issue from the memorandum submitted by the Education Section of the British Psychological Society is quoted with approval. And the Committee endorses views put forward in that memorandum (and by the majority of witnesses) with regard to the "subjects" of the curriculum. The report says, "We think that the time has now come to consider these conventional categories with a view to relating the curriculum more closely to the natural movement of the children's minds . . . " "What is required, at least so far as much of the curriculum is concerned, is to substitute for it (i.e., the traditional "subject" approach) methods which take as the starting-point . . . the

experience, the curiosity and the awakening powers and interests of the children themselves." Here is a revolution, surely !

In establishing its views as to the self-sufficiency of the primary school as an educational unit, the report is careful to bring out the need for continuity between the work and atmosphere of the primary school, and that of the infants' school before it and the schools for adolescents after it. The point is well made more than once, and practical suggestions as to how the continuity with the infants' school can be maintained are offered. And yet I personally should have liked to see this emphasized still further. I am less convinced than the Committee seems to be that these years of life form a psychological unity. At any rate, I think it is very easy to over-stress the psychological justification for the dividing line at the lower end. There is more reason for the administrative changes at the upper end. The practical grounds for both are good enough, but I should have liked to see the necessity for intimate contact and continuity of life between the infants' school and the primary school underlined even more heavily.

Turning now to the explicit statement, in Chapter III, of the psychology accepted by the Committee as a basis for its recommendations, one sees at once the great prestige which Professor Burt's views have rightly enjoyed with the Committee. (The chapter closes with a particularly valuable section on the influence of the environment on young children.)

Professor Burt's memorandum, included as an appendix (along with an equally valuable memorandum on anatomical and physiological characteristics by Professor H. A. Harris), summarizes the available facts about the mental life of children at this period of life. After speaking of these years as the Dark Ages of childhood, and bringing out the urgent need for systematic research, he first shows the insubstantiality of the "stratigraphical" and "recapitulatory" theories of development, in the light of the steady advance in mental growth revealed by tests of general intelligence, and of the high inter-correlations of specific intellectual abilities in these years.

He goes on to survey in detail the various sensory capacities and aspects of movement, and then turns to the "higher" mental capacities. In spite of the darkness of our knowledge of mental life at this time, Professor Burt is able to bring together a great many important data. And although he presents them under such dry anatomical rubrics as "attention," "memory," "reproductive and constructive imagination," and so on, it is hardly necessary to say that the actual picture he gives us is of whole and living children, thinking and acting in characteristic ways.

There are enough significant facts in the sections dealing with the child's perception of relations and what he can and cannot do in the way of reasoning, to make a difference to methods of teaching in most directions in the primary school. Further researches are certainly called for, but educational reform need not wait upon their future.

It is, however, the section on emotional development which is likely to make the biggest difference to the children in the primary school. It is not so satisfactory as a theoretical statement, and hardly could be in the present state of this branch of psychology. Professor Burt corrects the over-simple view of human instincts (on McDougall's lines) presented in his text, by a foot-note referring to the views of the behaviourists and the psycho-analysts, and reminds us of the theoretical difficulties of the whole problem. But his own concrete description of the observable facts of children's interests and spontaneous behaviour throughout this period of childhood will do more than anything else to enliven the teacher's understanding of his pupils. Here can be found the practical insight into the actual ways and needs of children which will enable the teacher to give body and life to the Committee's wise recommendations.

SUSAN ISAACS.

BOOK REVIEWS.

Personality and Will: By FRANCIS AVELING, M.C., D.Lit., etc. (Nisbet and Co. and Cambridge University Press, 1931. 5s.)

The Contemporary Library of Psychology, of which Dr. Spearman's *Creative Mind* was the first volume, is designed to deal in a popular but accurate way with the different major topics of the science. This, the second volume, is contributed by the General Editor of the series.

After an introductory chapter on the General Setting of the Problems, more than a fifth of the book is given to history. It seems doubtful whether these highly compressed summaries of the views of philosophers and philosophic schools (from Animism to Wundt) can have much value either for readers who already have a background of knowledge or for those who have none; and, perhaps, in a future edition, these chapters might be modified. Chapter I in its general survey finds a provisional clue which is stated in a quotation from Woodworth: "The self is first known as wish or will, and probably that always remains the core of anyone's conception of himself." From this the reader could well proceed at once to the extremely interesting Chapter V, which describes modern experimental researches upon will.

The pioneers of this research, in Dr. Aveling's opinion, were Narciss Ach (Göttingen, 1905) and Albert Michotte (Louvain, 1910). Ach staged a battle between will and habit, to measure the strength of will. Let the subject weld together pairs of nonsense-syllables by so many practice-repetitions; then instruct him to react to a given syllable *not* with the associated syllable but, e.g., by supplying a rhyme. Later experimenters have brought complications to light; victory seems to depend not merely on strength of resolution but on details of the direction of attention. Ach's enduring achievement, Dr. Aveling holds, lies not in his conclusions about measurement but in his fine analysis of the act of will, and especially in his stress on a unique element, the experience "*I truly will.*" Later experiments, making important use of the psycho-galvanometer, have established a clear distinction between this experience and any experience of effort. "Will is not itself effort, though it may initiate effort even of an extraordinary kind." Similarly, Michotte's experiments on choice have brought out a stage he calls "consciousness of action," which appears to be exactly the same thing. "All the researches upon the will to which reference has been made point to an immediate experience of self-activity. . . . The self as will emerges as the core and central nucleus of human personality."

This is the pivotal chapter of the book, and Dr. Aveling takes its conclusion as the interpretative clue in his further chapters on Instinct and its development and control through Sentiments; and as basis in discussing the ultimate nature of personality and the problem of determinism. The central certainty is "the indubitably direct and insightful awareness of the self freely energizing." This is "the original and indisputable datum upon which all our concepts of substance, energy, causality, freedom, determinism, and even the Uniformity of Nature in the last analysis, are seen to rest." H.M.W.

Social Psychology: By E. T. KRUEGER and W. C. RECKLESS (Longmans, Green and Co. Pp. 578. 15s.)

This addition to Longmans' Social Science Series is planned as a text-book for use in connection with either long or short lecture courses. The early chapters on Human Nature, Language, Social Contacts, Social Objects and Social Definitions, Social Behaviour, Human Motivation, and The Analysis of Wishes, were prepared by Professor Reckless; the later chapters on Imagination and its Social Function, The Nature of Altitudes, Personality, Traits of Personality, and Social Adjustment by Professor Krueger.

Emphasis has been placed on the analysis of the development and functioning of human nature and personality rather than on group psychology and the study of the comparative mentality of peoples. The subject matter of each chapter has been treated as a unit so that there is some overlapping, some points being dealt with in slightly different contexts in the various chapters.

Throughout the book the authors suggest that social environment is more important than native equipment in determining human nature, and even state that " it looks as if we can dispense with the concept of instinct in the study of human nature " (p. 158). Some students may not accept all the conclusions reached by the authors, and may regard some of the arguments as inclusive; they will, however, find much valuable material in the text, in the quotations from authorities, in the classified references to authorities and to articles in journals, and in the cases described. In addition, there are useful exercises and thought-provoking questions on each chapter. A.E.C.

Child Psychology: By MARGARET WOOSTER CURTI. (Longmans, Green and Co. Pp. 527.)

This book is a most useful introduction to the study of child psychology, extended as it has been in recent times by numerous experimental enquiries. Professor Curti has made a very extensive survey of recent material and incorporated it here. But the book is no mere compilation of results. The whole is bound together by a thoughtful and careful discussion. It is written in a remarkably clear style, and the judgment seems to the reviewer to be wise and cautious throughout. The book starts with a discussion of the child's mental inheritance and the relation between physical and mental growth. Very illuminating treatment follows of the new work on conditioned reflexes and on perceptual processes. The place of instinct seems to the reviewer to be underestimated. It is clear that Professor Curti would not, for example, approve of the emphasis put by such a writer as McDougall upon the significance of human instincts.

There are other points of less importance which seem open to criticism; for example, there is a suggestion that mental development is shown to be " continuous rather than saltatory " by the fact that a given performance steadily improves on the average with age among 500 pupils of different ages; whereas such an average curve may conceal plateaux and sudden rises in *individual* cases.

My criticisms, however, would only be on individual points; the general treatment (which in later chapters covers intellectual development, motivation in learning, play, and juvenile delinquency) seems admirable. C.W.V.

The Education of Children: By ALFRED ADLER. (George Allen and Unwin, Ltd. Pp. 309. 12s. 6d.)

This is a welcome book in that it represents the attempt to make a direct application of Adler's psychology to the treatment of young children and to their education. It is very lucid, which is not true of all Adler's writings, and full of concrete material, which will stimulate interest. Adler, one need hardly say, has many suggestive things to say about the effect, upon young children and adolescents, of a feeling of inferiority. It is regrettable to find again, however, the exaggerated importance, the almost exclusive importance, which he attaches to his own characteristic views on the inferiority complex. No doubt laziness may in some cases, as he suggests, be a pretence in order to cover a genuine lack of ability; but can anyone believe that it is invariably or usually so? Is it necessary to call in such a subtle interpretation? Also, why should Adler so readily dismiss the possible influences of heredity, and why should he assume that a child's character is largely determined by the age of five or six when he himself gives striking examples of the ways in which new influences may develop new traits during adolescence?

The book closes with a long appendix giving the details of five case histories, which are interesting as showing not only the mode of analysis but the manner of treatment that Adler's system adopts.

An Introduction to the Psychology of the Classroom: HOLLEY. (D. C. Heath and Co. Pp. 257+xiii. 6s.)

This book is written from the standpoint that for the classroom teacher theories and schools of psychology become insignificant and an understanding of the behaviour of the child and the workings of his mind become fundamental. The points included are those which seem to the author to be most helpful in interpreting the teacher's problems. Such topics are heredity and environment, individual differences, instincts, emotions, bearing, formal discipline, the measurement of mental abilities, mental abnormalities and their relation to mental hygiene.

The treatment is necessarily summary, but the presentation is concise, clear, and readable. It is sufficiently detailed to encourage the student to turn to the suggested readings, which are numerous, and include certain English writers, and to attempt some of the exercises which are a feature of every chapter.

A useful short note is given as a guide to what may be expected from each reference.

Gestalt Psychology: By WOLFGANG KÖHLER. (London: G. Bell and Sons, Ltd., 1930. Pp. xi+304. 15s.)

Gestalt theory is not easy to understand, but Professor Köhler's book, *Gestalt Psychology*, first published as a British edition in 1930, gives us some assistance. Indeed, seeing that it is in the author's own words "the incomplete portrait of an incomplete thing," expressed moreover in what for the author is a foreign tongue, and designed for the comprehension of the layman, the book is a considerable achievement.

Gestalten (or configurations) are those segregated wholes met with in nature, in the organism, and the objects fashioned by man, which, in consequence of sensory dynamics (i.e., interaction, stresses and strains between the organism and the physical world) can be experienced only as unities. The same general type of dynamical process which leads to the segregation of extended wholes will also explain their qualities, form, and inter-relations. Many experiments, mainly in visual perception and animal behaviour, are quoted in support of the thesis, which is further upheld, though indirectly, by penetrating argument and observations, calculated to overthrow competing theories.

The theories Köhler attacks (viz., Behaviourism and Associationism of the Mill and Hume type) certainly are open to assault: there are, however, other suppositions, unmentioned by Köhler, some of which may be found in the works of Ward, Stout, and Spearman, which would appear to explain facts quite as well, if not better, than the Gestalt hypothesis.

Professor Köhler's book calls for a more detailed criticism than can be given in a short review: his theory of configurations, if not found wanting after further testing, will make a considerable contribution to the psychology of learning, and therefore to the practice of teaching. M.H.

Harrow Lectures on Education: Edited by T. F. COADE. (Cambridge University Press. Pp. 230. 10s. 6d.)

This book deserves notice here because of the psychological nature of a number of the lectures given in what must have been a delightful conference at Harrow School last year. One of the lectures of special psychological interest was that given by Dr. Crichton Miller on the "Psychological Understanding of the Adolescent." Public school masters must have sat up with surprise when Dr. Crichton Miller, announced to lecture on the psychological understanding of adolescents, gave his hearers a straight talk on their incompetence to understand themselves without a proper understanding of the unconscious, and on the impossibility of proper treatment of pupils without an understanding of self.

From this point of view the lecture was admirable. It is a pity that Dr. Miller had not the opportunity of following up with a more detailed study of the adolescent.

Another lecture, by Dr. Douglas White, deals wisely with the subject of sex. The head master of Rugby, in a lecture on "Discipline," includes in a popular way a

good deal of common-sense psychology, given in a style which must have made the lecture delightful to hear. Some psychological treatment is inevitable also in other topics, such as " The Æsthetic Side of School Education " and " The Contribution of Classics to Education." In this last lucid and broad treatment of the subject by Dr. Pickard-Cambridge, it is regrettable to find the survival of the faculty psychology and the formal training argument, but it is particularly interesting to find the suggestion that an English translation should be used to show boys the beauty of, say, Euripides.

Other lectures in this most interesting book include the " Significance of Science in Education," dealt with in the broad philosophical way one expects from Sir Percy Nunn, and a series of half a dozen useful lectures on " The Teaching of Religion and the Bible." C.W.V.

Psycho-Analysis for Teachers: By ANNA FREUD. (George Allen and Unwin, Ltd. Pp. 117. 3s. 6d.)

This little book consists of lectures given to teachers at the Children's Centres in Vienna. It provides a good introduction to the Freudian view of early child psychology, and a brief exposition of the suggestions psycho-analysis may offer to the teacher.

In this brief compass, however, the author could not possibly deal with the evidence for the doctrine that she enunciates, and the tone of the book is therefore somewhat dogmatic. The reader must take for granted that evidence lies behind. Some of the arguments seem to be very lax; for example, the statement that the very fact that the events of very early childhood are forgotten is a legitimate cause for suspecting that something of importance is hidden there. The author seems to overlook the fact that the utterly trivial is equally forgotten.

The translation is admirably done, and the book is very clear and elementary.

Academic Prognosis in the University: By HAROLD A. EGERTON. (Warwick and York, Baltimore, Inc. Pp. 83. $1.88.)

This is an account of a very interesting experiment made in the Ohio University by giving students an intelligence test. This was used as a means of estimating their probable performance by the end of the junior college course eighteen months later. The correlations obtained between tests and college work were about 0·5. The original idea of this enquiry, however, was to add to the results of the intelligence tests the performance of the students at the end of the first quarter, and so find another combined means of prognosis. It was found that this greatly increased the correlation with the final performance in the junior college course, the correlations averaging about ·85. With the addition of the results of the second quarter the correlation rose to about ·9. Here, it is suggested, is a very reliable means of estimating the probable final performance of these students.

A Library for Intermediate Grades: By E. COLBURN. (University of Chicago Press. Pp. 150.)

This is the first number of a series of publications of the Laboratory Schools of the University of Chicago.

The author gives a short account (pp. 1-33) of the methods used to stimulate and guide the voluntary reading of pupils aged 10-12 in the laboratory schools. The remainder of the book is an annotated list of the books most frequently chosen by these pupils. A.W.C.

FOREIGN JOURNALS.

ZEITSCHRIFT FÜR PÄDAGOGISCHE PSYCHOLOGIE (Leipzig). July-August, 1930.

"*Lehrling und Schrifttum*": By Dr. H. HOCHHOLZER, of Vienna.

This is a study of information collected from vocational continuation schools as to the favourite reading of apprentices between ages 15 and 19. These are a post-elementary school group already engaged in daily work. Some 23 per cent confess that they do not read, chiefly from lack of interest or occupation with sport. At all ages tales and explorations are popular, drama only at 19. Science is only moderately attractive, and after the day's work there is little interest left for technical studies. The seventeen-year-old German lad is reported as omnivorous, reading a greater variety of literature than those either older or younger, as though the mind reached a summit of wide interests in that year and afterwards began to specialize. War books are not necessary in juvenile libraries, but travel and adventure literature is essential and corresponds to a fundamental instinctive "Wandertrieb." Boys read with the expectation of getting something of advantage for their trouble, but do not easily find this without adult help. Technical works are not rejected when in a narrative form appealing to youth. The education of a critical sense is the best guarantee against trash.

ZEITSCHRIFT FÜR PÄDAGOGISCHE PSYCHOLOGIE. 32. Jahrg. Nr. 4. April, 1931. Contains:

Vergleichende Untersuchungen über die Alkoholwirkung bei Schulkindern": By Dr. C. ERLACHER, of Munich.

These researches on the action of alcohol on school children are a continuation of earlier experiments on boys aged 10 to 14, the results of which were published in 1906 and 1912. It was found that out of 4,455 girls, in Mülhausen in April, 1906, 1,782 had wine, 1,165 beer, and 311 brandy on the previous Sunday, and in three schools questioned only 12·6, 18·3, and 17·5 per cent of the girls never took alcohol. For the experiments now reported the tests were arithmetic, reading, and skill in threading beads. The standard dose was 10 c.c. alcohol+10 c.c. raspberry juice+50 c.c. water. The girls were much keener on their work than the boys. Five alcoholic days were alternated with five alcohol-free days. Percentage marks are shown for each test for each girl and each day, a preliminary test giving the standard 100 of reference. The averages of the five alcoholic days compared with the five alcohol-free days generally show a depression of output after alcohol. When all the figures for all the girls are averaged the depressions are 8·0 and 7·6 per cent for arithmetic, 4·0 and 1·6 for reading, and 3·0 and 5·0 per cent for bead threading; each test had been tried in duplicate each day.

VOLUME I. NOVEMBER, 1931. PART 3.

PROFESSIONAL COURSES IN THE TRAINING OF TEACHERS.

A REPORT ON AN ENQUIRY INTO VALUES. PART I.

BY MARGARET PHILLIPS.

I.—*Origin and method of the enquiry.*
II.—*Value of courses in psychology and general principles of teaching.*
III.—*Value of courses in methods of teaching special subjects.*
IV.—*Value of courses in discipline.*
V.—*Summary of results and conclusions. (Part I.)*

THIS investigation had two points of departure :

(1) Some views expressed by the Teachers' Training Syndicate of Cambridge University in the course of a report on the Cambridge Training College for School Masters (see the *Cambridge University Reporter*, 28th October, 1930).

(2) Some remarks made by the Head Master of Harrow School at the first Junior Public Schoolmasters' Conference in January, 1930 (see *Harrow Lectures on Education*).

First as regards the Cambridge Report. The Committee state that though they began by enquiring into a particular college, " it soon became clear that it was necessary to report generally upon the training of teachers," and, further, that " they were encouraged to make the attempt by the Board of Education." This suggests that their report has significance and interest for training colleges in general ; we therefore look more closely at their recommendations.

The first of these concerns the relative importance of the theoretical and practical courses. In view of " the opinions expressed by a large number of former members of the Training College who, in the light of their subsequent experience as teachers, testified to the special value

of the practical course," the Committee recommend " that all students in their fourth year should be given two terms' practice in schools, preferably in boarding schools, and that the two winter terms of the fourth year should be set apart for the purpose." This " would involve a greater number of students being sent away from Cambridge for their practice in schools, and consequently the staff of the training college would not be able to supervise the practice of their students to the same degree as hitherto." The Committee regret this, " especially as it runs counter to the principle of a close connection between theory and practice, but they . . . wish strongly to urge that it possesses the advantages of developing a wider experience and encouraging a greater breadth of outlook."

Next as regards the theoretical course. The Committee " considered in detail the scope of the instruction," and " came to the conclusion that the most valuable subjects for instruction are reading, elocution, discipline, and the teaching of special subjects." They " devoted considerable attention to the question of instruction in the principles of education " and " were of the opinion that it would be desirable for the instruction to be based mainly upon the normal problems which occur in school life rather than upon a detailed course in theoretic psychology." They " believe that as the time at the disposal of the students is extremely limited and the science of psychology is both vast and controversial, the less ambitious scheme is not only safer but more valuable. They consider that if in a comparatively brief course of training great stress is laid upon psychological principles there is a real danger of theories being accepted without being fully understood, and of students becoming doctrinaire teachers."

Finally, the Committee " are not prepared to subscribe to the dogma that no one can teach efficiently without being trained."

The second point of departure is the following passage from Dr. Norwood's address as reported in *Harrow Lectures on Education* (page 5).

> " Teaching then is more than a technique ; it is a life. And I start from that without in any way belittling, or attempting to belittle, the values of training. Training enables a young master to anticipate by five years the attainment of what I might call his natural teaching efficiency . . . It saves waste of effort on the teacher's part ; it saves waste of the time and the brain-power of

the taught. But that man will be a very limited teacher who thinks that all he has got to become will follow normally from making himself a thorough pupil of the Director of Method and the Professor of Pedagogics."

Assuming that a discussion of training with special reference to a particular college on the one hand and to "public school" problems on the other may at the same time, as the Cambridge Committee suggests, possess a wider significance, the following questions suggest themselves:

(1) What are the most valuable subjects of instruction in the "theoretic course?" What, in particular, is the value of courses in (a) psychology, (b) methods of teaching special subjects? Is there a case for special lectures in "discipline" (an idea new to me) or can this matter be dealt with in the psychology and principles of teaching courses?

(2) What is the relative value of the theoretic and practical courses? Has the practical course, in particular, the special value attributed to it by the Cambridge Committee?

(3) As regards the period of practical training; which has more value—complete immersion in the life of the school during the period, or the maintenance of a connection with the college and so with the theoretic aspects of teaching? In particular, which is more conducive to "wider experience and greater breadth of outlook?"

(4) How far is it true that one can "teach efficiently without being trained?"

(5) Has training any further value than "to anticipate by five years one's natural teaching efficiency?" i.e., Has it any contribution to make to "life" as well as to "technique?"

As regards the method of enquiry. The members of the Cambridge Committee state that they were "strengthened in their views by the opinions expressed by a large number of former members of the Training College in the light of their subsequent experience as teachers." We are not told how the witnesses were selected; what lead was given or questions asked; whether the evidence was taken orally or in writing; and no

attempt is made to evaluate it, either quantitatively or qualitatively. In fact I was reminded when reading the report of the saying of an eminent psychologist to the effect that " nothing is so unscientific as the procedure of scientific men when dealing with an unfamiliar type of material !" At any rate it seemed worth while to institute an enquiry on similar lines but where these particulars should be available. I therefore drew up the following questionnaire.

What do you feel to have been the value of the following to yourself :

(a) *Courses in psychology, principles of teaching, methods of teaching special subjects,* history of education, social study, etc. ;

(b) *Practical work*—demonstration lessons, criticism lessons, *school practice,* school visits, etc.

Do you feel that the value of (a) and (b) above can be separately estimated ?

With regard to such value as you feel your training to have possessed :

(a) Was it more apparent when you first started teaching, or later on ?

(b) *Did the value lie in its direct practical bearing on school work, or in contributing to your own personal development—e.g., helping you to form your own philosophy of life ?*

Can you make any suggestion for improving such training as you yourself underwent ?

In particular *do you feel that experience in a good school under the guidance of the staff would be an adequate substitute for training ?*

Has your own experience led you to any generalization as to the difference between trained and untrained teachers ?

The questionnaire was sent out in the first place to personal friends and to old students of two University Education Departments and two two-year colleges in which I had worked.* By these students it was passed on to friends from other colleges, and finally, by the kind co-operation of Professor Valentine, the staffs of a number of Boys' Secondary

* In the case of students attending two-year colleges, for whom professional training is not necessarily dissociated from other aspects of their college career, a covering letter was attached asking them specifically to leave out of consideration the social value of college life and the academic education given—i.e., anything which might equally well have been obtained at a non-vocational college, and to concentrate on the professional aspect of the course.

and Grammar Schools were circularized. In this way I secured sixty-six replies from women and twenty-four from men, distributed as follows :

By Training.	*Men.*	*Women.*
Trained graduates	18	14
Three-year trained non-graduates ..	2	13
Two-year trained non-graduates ..	3	38
One-year trained (certificated) ..	—	1
Untrained graduate	1	—
	24	66

By Type of School.	*Men.*	*Women.*
Secondary and High Schools	18	7
Central Schools..	—	7
Private Schools	—	3
" Special " Schools	1	4
Elementary Schools	5	42
P.T. Centres and Teachers' Classes..	—	3
	24	66

The total number of training colleges and university departments represented is not known, as by Professor Valentine's advice, reference to the centre of training was made optional in order to ensure freedom of expression of opinion. Fifteen of the replies are in this sense anonymous ; the remaining seventy-five represent nine university departments and eight two-year colleges.

Since training has changed rapidly during recent years, and only current practice is really in question, I originally intended to refer the enquiry only to teachers trained during the last twelve years, i.e., since the war. Although this rule has not been completely adhered to, it is still true of the majority of replies.

Those parts of the questionnaire which proved to be relevant to the five questions listed are printed in italics ; the remainder of the material collected is not presented here.

We proceed now to present, in the form of summary and samples, the material relevant to each question and then attempt to answer the *question in the light of the material so presented.*

II.

(1) WHAT ARE THE MOST VALUABLE SUBJECTS OF INSTRUCTION IN THE THEORETIC COURSE? (A) WHAT IN PARTICULAR IS THE VALUE OF COURSES IN PSYCHOLOGY AND GENERAL PRINCIPLES OF TEACHING?

Value of Courses in Psychology and Principles of Teaching.	*No. of Replies.**	
	Men.	*Women.*
A—THE COURSES CONTRIBUTE TO PERSONAL DEVELOPMENT:		
1.—Contribute to self-knowledge; help to overcome inhibitions and taboos, etc.	—	14
2.—Help to develop a balanced attitude to life and to form a philosophy	—	8
3.—Contribute to interest in, and understanding of, one's fellow-men	—	10
4.—Teach the importance of careful observation and experiment; help one to think scientifically, to look for underlying principles, connections, causes, and to forecast results	1	15
B—THEY ARE OF VALUE PROFESSIONALLY:		
1.—Contribute to the growth of educational aims and ideals; give a standard by which to judge new theories	1	10
2.—Reveal the fundamental difficulty, and hence the interest, of the teaching problem	1	9
3.—Help one to understand the nature and needs of one's pupils (and of their parents!)	1	18
4.—Reveal the importance of both environmental and hereditary factors	—	3
5.—Help one to appreciate and respect individual differences	2	14
6.—Hence make possible class management without resort to punishment	—	8
7.—And help in dealing with difficult and abnormal children—backward children, defectives, difficult adolescents, etc.	—	16
8.—Throw light on the learning process; help to enlist interest and activity, to select and present material	2	15
9.—Help one to anticipate and to profit by experience; to save time and energy, to avoid mistakes, and to solve problems	2	11
10.—So contribute to the ease, pleasantness, and success of the work	1	6

Value of Courses in Psychology and Principles of Teaching.	*No. of Replies.**	
	Men.	*Women.*
C—CRITICISMS, QUALIFICATIONS, AND SUGGESTIONS:		
1.—Previous practical experience is necessary if the full value of the course is to be obtained†	—	8
2.—The course is too abstract and academic and insufficiently practical; it needs to be closely related to actual problems by lecturers who are themselves experienced teachers	3	6
3.—Fuller study is needed if deep interest is to be aroused; books have proved of more value than lectures	4	2
4.—More time (for lectures or coaching) is needed.. ..	—	4
5.—More experimental work asked for	—	3
6.—More group psychology as opposed to "individual" psychology	—	3
7.—The course is interesting, but has little practical value	5	2
8.—The course is of no value	3	1
9.—Its value is largely neutralized by actual teaching conditions	—	2

Sample replies embodying each of the above points are given below.‡ Many of these have been drastically curtailed, mainly with an eye to space, but not otherwise edited.

A.1.—CONTRIBUTE TO SELF KNOWLEDGE.

"First of all, psychology explained and revealed a great deal about myself. By showing me that certain workings of the mind, e.g., suggestion, were common in varying degrees to all, it removed some foolish sensitiveness;

*This number represents in all cases the number of times the point is mentioned, no matter by whom. Hence the same person may be, and often is, counted several times over.

† This is a point which reappears at every stage of the enquiry, not only, as is shown in these articles, *à propos* of psychology, method lectures, school practice, but also as is not shown, in connection with social study, demonstration lessons, school visits, the value of training on first starting teaching. It is the one suggestion concerning which there is most unanimity, and is, I feel, for administrators of training colleges, the most important single point which emerges from the whole enquiry.

‡ My original intention was to present these throughout in the proportion of one sample to five replies received. Space has prevented this being done, but, nevertheless, I have kept the principle in mind.

in showing me what to look for in myself and others, it increased my sympathies with mankind, in general and particular; I learnt, or began to learn, rather, to be tolerant, where before I had been cynical and sceptical; it aroused idealism which had ebbed away during the year previous to college." (*W.*)

"Psychology gives me a feeling of peace with the world. Until I went to college my time was wholly occupied with slogging for examinations. Such knowledge as I had of sex matters and the evolution of life was rather terrifying because it had not come from books, and it had never been aired in discussions. The college course of psychology cleared up many of my difficulties and enabled me, not only to look my bogies in the eye, but also to cease to regard them as bogies. As life and living are matters of tremendous importance, I feel that the course of psychology was tremendously important and valuable." (*W.*)

"It helped me personally. I found out how to help myself in my difficulties—of mind, etc. It helped me when nothing else could—for one leaves college at a difficult period in life." (*W.*)

A.2.—Help to form a philosophy of life.

"Courses in psychology are obviously valuable, though chiefly in the effect which they have on the teacher rather than as regards the knowledge of the child which is obtained (though the latter is of value, naturally). In tracing the development of a child through its various stages, the mind is trained to analyse and understand action. From the particular the mind moves to the general and not only focusses upon the child, but upon itself and other aspects of life. The bigger issues may thus be faced, those issues which help to formulate the individual's philosophy of life." (*W.*)

"The course in psychology enabled one to readjust one's whole attitude to life and its problems, and to develop a balanced practical attitude. This value bore on practical work in that it enabled one to understand the child and to help it to become a useful member of society." (*W.*)

A.3.—Help in the understanding of one's fellow men.

"I hope that I don't confine my small knowledge of psychology to the children at school nor to children alone. It has helped me to understand several rather trying grown-ups." (*W.*)

"Of all the courses in college, the psychology has done most for me. It gave me an interest in humanity that isn't practically useful, but which stays at the back of my mind and from which in times of need comes help. Psychology gave me understanding and sympathy on which you can build up the patience and courage you need." (*W.*)

A.4.—Help one to think scientifically.

"I think that the course by teaching me the importance of careful observation and experiment was of very great assistance." (*M.*)

"I think the thing for which college is most to be thanked is the training to look below the surface; not to accept the face value of a child judged by his work and behaviour, but to look for causes and to regard appearances as logical effects." (*W.*)

"In the psychology taken at college and the consequent interest aroused in the working of the minds of children lies, I think, the greatest contribution that college offers to the would-be teachers. At the start of her career she

may not know how to tackle a class well, but she should have the foundation of a real understanding of children. She realizes that each child is a distinct personality, that behind a line of conduct lies a motive. Her job is to examine both and to let the result of her examination determine her treatment." (*W.*)

B.1.—HELP TO BUILD UP PROFESSIONAL AIMS AND VALUES.

" Principles of education also served to broaden one's personal outlook. One realized that the object of education was the development of the child, and not, as one felt in one's school days, a method of collecting mere marbles with which in after years to play the game of life." (*W.*)

" The courses in psychology, principles and methods of teaching, made me first start to consider seriously my own school education. I had attended a small village school and later a mixed secondary school in a tiny market town. I was prepared, in a great measure, to teach as I had been taught. The new principles to which the lectures introduced me first gave me opinions as to what was good and what was bad in my school life." (*W.*)

B.2.—SHOW THE INTEREST AND DIFFICULTY OF THE TASK.

" Such skill as I possess I attribute to this source, because I was deeply impressed by the difficulty of a task which had previously seemed perfectly simple and straightforward." (*M.*)

" So also I became much more interested in the children I was to teach; more interested in them as individuals and in classes. At the same time, the difficulties and complications to be expected rose in mountains, but, at any rate, teaching was going to be very much more absorbing than I had anticipated. I no longer looked forward solely to conquering a little world of little people; but to trying to understand them as people." (*W.*)

B.3.—HELP IN THE UNDERSTANDING OF CHILDREN.

" A course in psychology recreated my childhood. As a member of a very small family I had been entirely out of touch with children, especially young ones, for about twenty years. By the time I went to college I had forgotten nearly all the experience of childhood. I'd forgotten how to think as a child. The psychology course was like going back to a first home and realizing, with a shock, that the garden was only one-tenth as large as one's memory of it, that the cowhouse door, which seemed as large and strong as a city gate, was only now up to one's shoulder, and that I had once cried heart-brokenly because I thought I was going to be left when mother was only a few yards away at the other side of the stackyard. In the same way I had forgotten what a tragedy it was when a simple sum would not come right, or how difficult it was to repeat the ten commandments alone each Monday morning." (*W.*)

" Before going to college I regarded children in the light of little savages waging war against all authority and teachers, especially young ones.

" The first psychology lectures were a sort of ' divine revelation ' to me—I enjoyed them immensely and became tolerant—I think I am still tolerant. I try now to imagine what they are feeling and how they are thinking." (*W.*)

B.4.—SHOW THE IMPORTANCE OF HEREDITY AND ENVIRONMENT.

" Every bit of the psychological study I had has proved valuable. As far as the children are concerned our glimpses of the child mind help me

to look at each child as an individual—with special tendencies and characteristics; I learned to look at the home environment and enquire into the family history of any child who showed marked peculiarity; e.g., one I had last year was very diffident, quite intelligent, yet very slow at grasping an idea; that child was born after her father was killed in the war, which fact seemed to account for a good deal. Before going to college I had no idea of the influence and importance of environment and heredity. The more I know of the children's parents the less I feel I can blame them. It is wonderful they are not mere victims of fate to a far greater extent." (*W.*)

B.5.—Reveal individual differences.

"The value of the courses in psychology, etc., was chiefly this. They sent me out convinced that each pupil has a mind peculiar to himself and that it was one's business to adapt one's method as far as possible to that individual mind." (*M.*)

"Before coming to college I was too much engrossed in considering whether the class was working quietly (i.e., in class organization) to notice where individual children were needing help. It is in this helping of the individual that college gives such good guidance. Every bit of my psychological study has been invaluable; it has increased tenfold the interest of the teaching, and I hope the value has been enhanced, too. I learned that no child is a unit and learned to look for the various tendencies and characteristics of each one. (I don't know whether I develop my children too much on these lines, but both my classes have been hopelessly individualistic.)" (*W.*)

B.6.—Make possible class management without punishment.

"Knowledge of psychology has helped to lessen the strain of teaching junior boys and has enabled me to enjoy teaching, maintain good order without exercising rigorous discipline or having to resort to the use of corporal punishment." (*W.*)

"I read somewhere the other day of a man who thinks that no one should take a course of psychology or principles of teaching until he or she has completed twenty years of teaching! I think that without any previous theory those twenty years would, for many people, be unbearable. In a class of fifty one has quite enough "difficult" children to use all the psychology learned at college. Without fairly skilful treatment some of those children would upset the workings of every lesson. I certainly could not afford to experiment with my mixed class of eight-year-olds. With large classes one needs to anticipate the difficulties and avoid pitfalls wherever possible, otherwise one is soon overwhelmed. Just before Christmas we had a girl of about twenty-five observing classes. She wanted to become an uncertificated teacher. She was most surprised to find that different treatment had to be meted out to different children. Among many other things that dismayed her was the fact that the children in Standard I are "full of beans." She had no notion that at that stage they are for ever "up and doing." Without principles and methods to work upon, teaching would be one long grind." (*W.*)

B.7.—HELP IN THE MANAGEMENT OF DIFFICULT AND ABNORMAL CHILDREN.

"The value of the courses in psychology to me lies in the fact that apart from heightening my interest in children as individuals, it has been of real practical help in dealing with nervous, suppressed, backward and over assertive children. I had in my class last year two children—one reported as slow and diffident, the other so acutely nervous that her work suffered badly. At the end of the year both children gained Junior City Scholarships, a severe test on the nerves and ability of any child; here my knowledge of psychology helped me enormously in dealing with these children and obtaining satisfactory results." (*W.*)

"A course of adolescent psychology has proved most useful to me, clinching some ideas which I had gained as to the treatment of older children, such as more scope for freedom, chances to follow their own interests, some liberation from a set time-table." (*W.*)

B.8.—HELP WITH THE LEARNING PROCESS.

"I found the psychology interesting, new, and illuminating as to the nature of mental processes. I have endeavoured to incorporate in my own teaching what I learned about association of ideas and apperception and have found the five steps invaluable in forming a style of teaching." (*M.*)

"Courses in psychology helped me to realize the need for planning lessons, so that the interests of the children at each stage could be used and catered for as fully as possible." (*M.*)

(1) "Helped me to see how very little knowledge one must 'take for granted'; that it is fatal to make a child feel out of her depth." (*W.*)

(2) "Helped me to see the need for *variety* and the benefit of allowing the child scope for its natural desire for *activity*." (*W.*)

"In the actual teaching I have found some knowledge of the processes of learning most helpful, and I am constantly fighting against the temptation to do all the work myself and leave the class passive." (*W.*)

B.9.—HELP TO AVOID MISTAKES AND TO PROFIT BY EXPERIENCE.

"Of great value in saving months, or perhaps years, of personal experiment and mistakes." (*M.*)

"The average teacher works out a rough and ready psychology of his own; in the untrained man this is often quite unconscious; courses of psychology in training tend to shorten the time taken to acquire this practical psychology." (*M.*)

"Whenever I feel now that a particular lesson has been a failure from the child's point of view, the self-criticism, which the psychology course helps me to make, shows me where I failed." (*W.*)

B.10.—MAKE THE WORK EASIER, PLEASANTER, AND MORE SUCCESSFUL.

"The teaching of psychology in college produces the sympathy that is found in the classroom. Common sense may and does produce sympathetic results, but when the underlying principles that guide common sense are known, the teacher's task is made much lighter." (*M.*)

"I found the course in psychology of great value in helping me to understand the working of the child-mind. Before coming to college I had done a year's teaching, having entire charge of the small infant room with

about thirty children, whom I had to teach mainly by the light of nature. When I resumed teaching after two years at college, I found that my new understanding of the children had greatly lessened the difficulties and made the work far more interesting and pleasant." (*W.*)

C.1.—PREVIOUS PRACTICAL EXPERIENCE NECESSARY.

"For nearly a year I had to listen to instructions on teaching, to warnings about difficulties that I had never encountered, and to theories on subjects that I had never thought of teaching, so naturally the greater part of this has never been absorbed at all. I had no idea of what the lecturers were talking about half the time, simply because I had never had a try myself. It was all book-learning for a year, so to speak, with no chance of applying any of it. It is hardly necessary to add that my second year was infinitely more valuable to me, as I could then understand and appreciate all the points of the lectures." (*W.*)

"I, personally, should suggest more practical teaching before training, if possible; so that psychology, method, etc., has something experienced to refer to, otherwise much of the value is lost through it seeming 'in the air.'" (*W.*)

"I very much doubt whether I got any appreciable help from either psychology lectures or school practice and the like, because I had no experience to hitch on to. The same lectures and practice now would have ten times the value for me, for now I should know something of what I wanted and have some standards by which to estimate varying values of things that I heard and saw and did." (*W.*)

C.2.—COURSE TOO ABSTRACT AND ACADEMIC.

"It has seemed to me that the direct value of studies in psychology, principles of teaching, and so on, was largely futile, because so very far removed from actuality. I feel more life should be brought into discussions. For example, all lectures and discussions on psychology should be commenced by reference to a case, and the issue not confused by names which are—just names." (*W.*)

"The course of psychology I took when training I do not consider very valuable. It was too far removed from practical experience. I had done courses previously: (1) for Sunday school work when we had to find practical examples for the theories we studied, and were in close contact with children all the time so that we could watch and experiment; (2) at a W.E.A. course for parents and teachers where a large part of the time was taken in the discussion of everyday problems and the ways they had been solved, or could be, and of the results of trying various methods; (3) a four years' W.E.A. class of people who were occupied in various ways and so brought very different points of view to bear on the subjects under discussion. In these three courses we were in close constant touch with children and adults, had the benefit of the views of men and women with wide and differing experience that made the psychology of far more use and interest than it was in college, where the students had little experience either of children or of the world, there was a very limited chance for practical child study, and not much time for discussion." (*W.*)

C.3.—BOOKS OF MORE VALUE THAN LECTURES.

"Psychology: lectures found to have little practical value; of much more use and more interesting were books of Applied Psychology." (*M.*)

"Psychology was by far the most valuable, but the chief value lay in my reading, which went far beyond what was recommended by the lecturer. The books recommended to us contained (for the most part) second-hand ideas retailed by second-rate psychologists. It was only by studying more deeply that I became vitally interested." (*M.*)

C.4.—MORE TIME NEEDED.

"Psychological study to 90 per cent students is quite a new subject when they enter college. If simple experimental work as was taken in second year were put into the *first term's* courses, and this followed by double the quantity of the ordinary 'psychology lectures,' the subject would be much less difficult and far more thoroughly understood." (*W.*)

C.5.—MORE EXPERIMENTAL WORK.

"The results of some experiments worked during a short course in experimental psychology are among the most vivid things I can remember in my training; e.g., the difficulties of mirror writing, the proof that recency, vividness, and frequency were aids to memory training, when we were asked to write down a short poem after hearing it read once, and the experiment (of the coat of armour) on preperception which made clear Professor James' words that 'the only things we perceive are the things we preperceive, and the only things we preperceive are those which we can name.' I wish we could have had a great deal more of this." (*W.*)

C.6.—MORE GROUP PSYCHOLOGY.

"Although I have continued my own study since as well as I could, chiefly in the direction of mental deficiency, retardation and problematical development, I would like to have had a more intensive study in college of *group* psychology. An understanding of the individual, even with its peculiarities and exceptions, seems so much simpler and more natural to one than that of the group." (*W.*)

C.7.—COURSE INTERESTING BUT OF LITTLE VALUE.

"Lectures on psychology highly entertaining but practically useless. After all they all boil down to one thing—common-sense!" (*M.*)

"Psychology: very valuable in your general mental development. Actually, from the point of view of elementary teaching, unnecessary in practice. Your common-sense guides you fairly well I should say." (*W.*)

C.8.—COURSE OF NO VALUE.

"Psychology: I felt it tended to make me introspective and not too happy. I've tried hard ever since to forget it all." (*W.*)

C.9.—VALUE NEUTRALISED BY EXISTING CONDITIONS.

"The psychology course was certainly valuable, but perhaps rather in its interest to ourselves than in its practical help. If we had more time

and smaller classes it would be of greater use to us. But what we have to employ is 'mass" psychology—tricks of the trade. These could be equally well picked up through experience in a good school, I should think." (*W.*)

The answers reveal a striking sex difference. As far as our evidence goes women have far more use—both personally and professionally—for courses in psychology than have men. For many women this course is the most important part of their training. For many men its personal value hardly exists. One even writes as follows:

"I cannot understand what you mean by linking up a psychology and method course with the philosophy of life! I must confess that one's philosophy of life is hardly influenced by a course taken at student age. Philosophy of life is not affected to any great extent by books on psychology, but the factors which influence it are environment, personalities with whom one comes into contact, one's reaction to religion, and so on."

For many men, too, its professional value is negligible, though as an academic study it has a certain intellectual and philosophic interest.

Why this difference? Is the subject better taught to women? (But in the university departments at any rate, the teaching given will be largely the same.) Have women a greater natural and temperamental interest in the subject? (But the leading psychologists tend to be men.) Are women more concerned with teaching as a form of personal relationship and men more with knowledge and the learning process? In the material used here there is an unfortunate cross-classification. The majority of men are, in fact, graduates teaching in secondary schools, and so largely concerned with academic studies and examination results; the majority of women are non-graduates teaching in elementary schools and so inclined to regard the "whole man" rather than the subjects taught as the first consideration. There appears to be a case for a further investigation from which this cross-classification shall be eliminated. As our material stands at present, the following two quotations seem to typify the two opposing points of view—that of the man-graduate in the secondary school on the one hand and of the woman-non-graduate in the elementary school on the other.

"Finally, I think that the value of a teacher's work depends not upon the excellence of his teaching method, but upon the degree of sincerity attaching to his interest in his subject or subjects. So I consider that the main function of the training college is to cultivate a satisfactory standard of scholarship, and that to this end 'principles of teaching,' 'methods of teaching,' should be treated with due brevity." (*M.*)

"We cannot do much specialising in school. For us the child is the first essential, the subject being a secondary consideration." (*W.*)

III.

We pass on to question

1 (B)—WHAT IS THE VALUE OF COURSES IN METHODS OF TEACHING SPECIAL SUBJECTS?

Methods of Teaching Special Subjects.	*No. of Replies.*	
	Men.	*Women.*
A—APPRECIATIVE:		
1.—Are very useful	7	2
2.—Are helpful to the novice, giving a jumping-off ground pending further experience and a starting point for working out one's own methods	2	8
3.—Are suggestive, revealing a variety of possibilities and safeguarding against monotony and "getting into a rut."	4	4
4.—Courses in "practical" subjects of more value than those in "academic" subjects	—	4
5.—Illustrate and show practical applications of the psychology course	—	2
B—CRITICAL:		
1.—Courses in special methods unnecessary. Every teacher must evolve his own. Those adopted will be the logical outcome of:		
(*a*) An understanding of psychology and general principles	—	3
(*b*) The teacher's personality in relation to his particular problem	2	3
(*c*) Intelligence, common-sense, power to learn by experience	—	3
(*d*) Enthusiasm for the subject and desire to impart it	1	2
2.—Practical teaching conditions prevent one from taking full advantage of the courses	3	4
3.—Books recommended proved of more value than lectures given	1	2
4.—Previous practical experience needed if courses are to have value	—	4

Sample replies follow as before:

A.1.—COURSES VERY USEFUL.

"I found Methods of Teaching of the greatest use, especially in my subjects, French and English." (*M.*)

"Method lectures very useful, particularly for specialists." (*M.*)

A.2.—Courses helpful to the novice.

"The average man produces in course of time his own individual method. Courses of method during training tend to shorten what may be called the probationary period, during which a man is 'finding his feet.'" (*M.*)

"The principles and methods of teaching were valuable to me during my first year to a certain extent; since that first year I have worked out my own methods and they have not agreed in many cases with the college ones, but the ideas given did help to make the foundations on which I worked." (*W.*)

A.3.—Are a safeguard against monotony.

"Of very much value. They helped me to try different methods and prevented me thinking children are all of one pattern. I hope they will be a safeguard against getting into a rut." (*M.*)

"The more methods understood, the less likelihood there will be of losing freshness in teaching. I have often wondered at the number of times an idea must be presented to a child before it has really been absorbed, and have been glad to know many and various ways of doing so." (*W.*)

A.4.—Courses in "practical" subjects of most value.

"But as regards the teaching methods of any one subject, I rarely referred to them—have forgotten them and destroyed notes on them. I use methods of my own—methods that vary with classes and types. Physical training methods, however, I have always used and still do. It was partly that by practice they became habitual; further, matters of opinion and feeling do not enter into this as into English, etc. In these subjects one needs not set methods as much as ability to evolve methods; to adapt; to criticise and to measure success." (*W.*)

"In certain subjects, such as handwork and drawing, the schemes which I made in college have been of great help to me since, and I have worked according to these schemes, but in literature, geography, history, and science, the principles and lines on which to work have been the most important." (*W.*)

A.5.—Courses throw light on the psychology course.

"The Principles and Methods of Teaching were useful, probably in so far as they helped to impress the practical use of the more abstract psychology." (*W.*)

B.1 (a).—Method follows from a knowledge of psychology.

"With a thorough understanding of, and interest in, the psychology of the child, the principles and methods of teaching seem to follow naturally. Without the psychology the courses in the latter would have seemed rather like subjects to learn by rote, instead of the natural outcome and supplement which they were actually." (*W.*)

B.1 (b).—Method an outcome of the teacher's personality.

"The methods I could have learned better myself from practical experience. You can only discuss them very generally; in the end they depend entirely on (a) yourself, and (b) the class before you. You evolve your own, and, though those of other people may be for a long time forced upon you, you will slip free of them, and I think you should." (*W.*)

B.1 (c).—METHOD DEPENDENT ON THE TEACHER'S INTELLIGENCE.

" Methods of teaching : depend upon the power of invention the teacher possesses, the exigencies of syllabus, apparatus, and intelligence of pupils, therefore I feel that method can only be taught as ' Hints and Suggestions ' and not as a necessary qualification in technique. A most skilled and scholarly H.M.I. assured me that there was no *method* of teaching history and I heartily agree, although I have somewhat successfully developed a technique peculiar to myself which aims at eliminating those errors from which I suffered when a child." (*M.*)

B.1 (d).—DEPENDENT ON KNOWLEDGE OF AND ENTHUSIASM FOR THE SUBJECT.

" If there is real knowledge, strong desire to impart it and sympathy with and intelligent understanding of those who are to be taught, methods will follow automatically." (*W.*)

B.2.—METHOD COURSES OFTEN NEUTRALISED BY EXISTING CONDITIONS.

" None of these has had direct effect on my teaching, as method has to be adapted ruthlessly to existing conditions, and these usually are so unlike those postulated in the method books that method courses can only give very general instruction. What both method and psychology courses seem to ignore is, that while the ' educo ' ideal of education satisfied the theorist, the teacher is chiefly concerned with working to a syllabus *against time* and, until examinations cease, education consists chiefly of cramming in as palatable a form as possible the knowledge required by the boy to pass his Matric. or Higher School Certificate examination." (*M.*)

B.3.—BOOKS OF MORE VALUE THAN LECTURES.

" Principles and methods of teaching—valuable as basis on which to build own plans of work, but could be obtained equally well by wisely guided reading." (*M.*)

B.4.—FULL VALUE OF COURSES DEPENDS ON PREVIOUS PRACTICAL EXPERIENCE.

" I do think that at least one year's practical teaching experience should be an essential qualification to entering a training college. By this I mean a year as an uncertificated but *responsible* teacher. This system would make the college course infinitely more valuable because one would know more what to look for, particularly in the different subjects, Methods of presenting things often bored us merely because we had never experienced the difficulty of actually presenting that subject to all too-human children." (*W.*)

On the whole it is now the men who appreciate the method courses and the women who reject them, though both suggest that they are particularly useful for " specialists." Is this perhaps for the reason already suggested—that secondary school masters, with their eye on examination results in a particular subject, are appreciative of help contributing to this end, while women elementary reachers, viewing their

work as a social service, tend to regard academic courses in "method" as unnecessary? Perhaps it is for this reason too that the women show greater confidence in their own ability to apply psychological principles to concrete cases, to connect theory and practice, than do the men. Consideration of intelligence would not apparently justify such confidence if "power to connect" is, indeed, a factor in general intelligence, and if our American colleagues are right in telling us that I.Q. of the average secondary school specialist is higher than that of the average elementary school teacher.

Or a further possibility. Do the women tend to reject the type of method course usual in two-year colleges because there are among them potential specialists forced by circumstances to become "general practitioners" and revolting against a mixed grill of method in all the subjects of the elementary curriculum? Here, at any rate, is one of them:

"*Methods* of teaching—of little, if any, use, because they were too diffuse and were as theories imposed from without, before a desire to teach all subjects had been created. Specialist training only would have been of much more value. I had no experience of teaching, so the points of contact were very few and I was forced to use memory instead of reason. Much of the 'method' was as feeding insisted upon where there was no hunger, while I felt what was akin to greed for knowledge of teaching of English, music, and philosophy (or religious teaching), and this was not appeased." (*W.*)

IV.

To conclude the first question:

1 (c)—Is there a case for courses in "Discipline" as apart from courses in psychology and general principles of teaching?

It will be noted that no reference to this matter was made in the questionnaire, which makes the fact of eight voluntary references to it in the answers all the more significant. Two men and six women contend that the theory courses do not give sufficient help with problems of discipline and class-management. It seems worth while to reproduce a generous sample of these remarks.

"Apparently unimportant devices—frankly, 'tricks of the trade,' such as little dodges for waking up a form of sleepy little boys—are never even mentioned. Sometimes it takes years for a teacher to arrive at these by himself." (*M.*)

"I should have found it useful if I had been taught more class management. At my first school I had some really impudent girls, and I didn't know how to deal with them properly. While I had been on school practice I had come up against nothing at all like this." (*W.*)

" At first most young teachers, women certainly, probably have a big struggle to control their children. I have heard many complain that they cannot manage them successfully. This problem is certainly the biggest—as *nothing* can be done until this is settled. If there *is* any way help is certainly needed in controlling children. I know it is a personal problem, and in a way only experience can teach it, but time and effort are often wasted in coping with this problem." (*W.*)

" I feel it would help a great deal if the question of ' discipline ' could be settled somehow for those freshly leaving college." (*W.*)

" It is here, I think, that a few hints—first-aids are invaluable. Almost I think I should give a series of talks on these. I never derived any help in college in the ways of obtaining attention. I knew the discipline I did and did not want—but failed, through not knowing how to get it. Rightly or wrongly (I do not even know if this is general) I thought I could not insist, could not impose my will. One must (and here is what I did not realize) and can do so, while yet retaining one's own high principles. In a sense it is a small point—yet it is the one most often discussed in elementary schools; the emphasis on discipline rather than method; and at the other end it is, I think, that point that weighs in college in deciding between a good and bad teacher. This is the place, I think, for compromise; where the training colleges should show not only the goal but the road to it. I may be over-emphasising this. I'm chary of writing about it; it is hackneyed, yet it is a matter for consideration, and one where training centres give no help." (*W.*)

" What value there was in my training is only gradually showing itself now—when I am fast forgetting all about it! At first I floundered so hopelessly in the heavy seas of discipline that I was stunned with the force of almost the only problem whose very existence I never realized. In such dire necessity I learnt enormously from my head mistress and the rest of the staff. It is thanks to them and to ' shoppy ' talk with other teachers and to occasional memories of college teaching that I am now working out my own salvation." (*W.*)

" The courses in the methods of teaching left me hazy when I was faced with a class of unmanageable girls. ' Discipline ' was the only thing in the world that mattered—it haunted waking and sleeping moments alike. The head master—the ' just-brute ' type, mocked at my ' fresh-from-college ' methods and made my life a misery, until I assumed the proper ' school-marm' manner and ' bossed the show '—as he put it."

What is to be done in this matter? The testimony which has already been given as to the value of psychology in connection with class management must not be forgotten. Can this further need be met, as has already been suggested, by greater attention being devoted, in the psychology courses, to problems of " group psychology " and by making the teaching throughout more practical in its reference? Or is the student right who suggests that two distinct types of help are needed from the college and the school respectively, thus:

"I feel that the help given by college is chiefly concerned with the preparation of lessons, the approach to children, how to obtain their interest and hold it. The teachers in the schools tend to stress the latter point by giving definite instruction in class management and control not through the lesson itself. I should say that the help the college gave will apply to many lessons, and enable an inexperienced teacher to prepare and begin all lessons on sound lines. This she might never acquire in schools. The help given by the staff of her school she will learn as she goes on. Being told certain tactics saves the time it would take her to find them out."

Or is there really a case for something in the nature of *ad hoc* tips unrelated to general principles? Or, finally, is the student right who says:

"In such matters as discipline it seems to me that every teacher has to work out his own salvation, and that, in fact, taking tips from others often leads one astray."

At any rate there does seem to exist a demand for something of the sort advocated by the Cambridge Committee. How this demand can best be met surely merits expert discussion.

V.

To sum up: our first question may, in the light of the evidence before us, be roughly answered as follows:

(a) Psychology is, to many students (mainly women), the most important subject in the theoretic course, and to some the most important part of the whole training. This value is personal as well as professional, and considerably outweighs any possible dangers.

(b) Methods of teaching special subjects are regarded as very important by many men (mainly specialists). For many women (mainly elementary teachers) they are chiefly of value to the novice.

(c) Though the psychology and principles of teaching courses are held to give some help in the matter of discipline, there is a demand for further help than is actually given in many colleges. The form which this help is to take is, however, not clear.

The remaining four questions will be dealt with in a further article.

Résumé.

LES COURS PROFESSIONNELS DANS LA PRÉPARATION DES PROFESSEURS.

RAPPORT D'UNE ENQUETE SUR LES VALEURS RELATIVES. (IRE PARTIE.)

Le rapport d'un Comité de l'Université de Cambridge au sujet d'un " Teachers' Training College" suscita des questions générales quant à la valeur relative des cours théoriques et des pratiques : le programme des cours, l'organisation du stage pratique, et la valeur générale de la préparation professionnelle.

Une enquête parmi 90 professeurs (24 hommes et 66 femmes) au sujet de la valeur de leur propre préparation aboutit aux conclusions suivantes :

(1) Le cours théorique a une importance au moins aussi grande, sinon plus grande, que le stage pratique. Un cours de psychologie est un élément indispensable à toute préparation professionnelle.

Übersicht.

KURSE FÜR DIE LEHRERAUSBILDUNG.

(EIN UNTERSUCHUNGSBERICHT ÜBER IHREN WERT.)

1. TEIL.

Der Bericht einer Komission der Universität Cambridge über ein Lehrerseminar warf allgemeine Fragen auf: über den relativen Wert der theoretischen und praktischen Kurse, über den Stoff des theoretischen Kursus, über die Organisation des praktischen Kursus und über den Wert der Ausbildung im allgemeinen.

Eine Umfrage bei 90 ausgebildeten Lehrern (24 Männer und 66 Frauen) über den Wert ihrer eigenen Ausbildung ergab folgende Resultate: (1) der theoretische Kursus hat eine ebenso grosse, wenn nicht grössere Bedeutung als der praktische Kursus. Ein Kursus in Psychologie ist ein unentbehrlicher Bestandteil der Ausbildung.

PRESENT TENDENCIES IN VOCATIONAL SELECTION.

By ERIC FARMER.

I.—*Early methods of vocational selection.*
II.—*The lower prognostic value of vocational selection tests for industrial proficiency, as compared with intelligence tests for scholastic performance.*
III.—*The superiority of complex vocational tests of industrial proficiency to simple tests.*
IV.—*Sample, analogous and general analytic tests.*
V.—*Conclusion.*

I.—Early methods of vocational selection.

Vocational selection is one of the most promising developments in applied psychology. Its importance is obvious and need not be stressed, but not so obvious—except to those doing research in vocational psychology—are its difficulties and limitations. In the early days of industrial psychology tests were applied to workers in many occupations and often high correlations were obtained between the workers' performance in certain tests and some measure of occupational proficiency. These results were received by some with great enthusiasm, for it seemed that psychology had given us a simple method of rectifying one of the evils of the industrial system, and since the results were so good and so simply obtained all that seemed to be required was an extension of the work until it embraced all categories of workers. There were others, however, who adopted a more cautious attitude and sought to satisfy themselves as to the reliability of the new methods. This was not always easy since the results were sometimes published in a way that made it difficult or impossible to analyse the methods employed. The experiments were often carried out on small numbers of subjects, they were as a rule not repeated, and, if they were, inconsistent results were sometimes obtained. Different experimenters using the same tests on similar groups often obtained different results.

Many of the inconsistent results obtained in the early days of vocational psychology were due to the small numbers of subjects tested. The ordinary methods of correlation are not really applicable to small

numbers and, if so applied, the correlation coefficients, positive or negative, tend to be larger numerically than those obtained from greater numbers. The method often adopted was to give a large number of tests to a small group of subjects and combine the score of the tests yielding high positive co-efficients (not always properly weighted) into a final score by means of which candidates were to be selected for employment. No correlation coefficient can be regarded as a true measure of the real relationships between two psychological functions but only as one in a series of coefficients clustering about a mean, this mean itself showing the real relationship. Since this is so it will easily be seen that confusion can arise if isolated coefficients are taken as typical of the true relation between two series of observations. The confusion is made still worse if these coefficients are obtained from small groups which tend to yield unduly high coefficients.

This confusion in the field of vocational psychology led some who had at first welcomed vocational tests with enthusiasm either to throw them aside entirely or to content themselves with the use of intelligence tests only in vocational work. Others looked to the development of the technique of the interview or of temperamental tests as the best way of advancing vocational psychology. There were, however, those who decided to examine systematically the possibility of measuring by means of tests the psychological functions involved in industrial occupations and it is with their work that this article deals.

II.—THE LOWER PROGNOSTIC VALUE OF VOCATIONAL SELECTION TESTS FOR INDUSTRIAL PROFICIENCY, AS COMPARED WITH INTELLIGENCE TESTS FOR SCHOLASTIC PERFORMANCE.

These workers obviated some of the early errors that arose from testing small groups and tried to establish the validity of their tests by giving them to several really large groups and taking the weighted mean of the correlation coefficients obtained in each group as an approximation to the true correlation. The results yielded by this more reliable method tend to show that the correlations between psychological tests and industrial proficiency are lower than those usually found between intelligence tests and scholastic performances.

There are many reasons that may account for this. In the first place industrial proficiency is dependent on so many factors that it is probable that no one test, however well it measures some dominant factor in industrial proficiency, will yield a high correlation with it since there is no one factor that plays so predominant a part in industrial proficiency as

intelligence does in scholastic performance. Industrial proficiency is determined by the interaction of several factors and unlike scholastic performance it does not make a very great demand upon one function but a rather small demand on many. In order therefore for vocational tests to be of real value as many different functions as possible must be measured and their relationship to the criterion determined. One of the chief differences between educational and industrial psychology in the use of the test method is that educational psychology is concerned almost wholly with one predominant function whereas industrial psychology is concerned with a group of equally (or nearly equally) dominant functions. The small but consistent correlations obtained between the tests used in vocational psychology show that none of the tests measure any but a small part of the total involved in industrial proficiency.

Another reason why the correlations yielded by vocational tests are usually small is that they are given to adolescents. During adolescence the mind becomes more differentiated, the special abilities playing a larger part in mental integration than they do in young children. With children simple sensori-motor tests correlate with one another and with intelligence, but with adolescents and adults they do not. Intelligence tests also intercorrelate in a lower degree with adolescents and adults than with young children. This process of differentiation that takes place at adolescence and continues throughout adult life is an important factor in vocational psychology, for there can be little doubt that tasks that require intelligence in their performance with children are more dependent on specific abilities and habit formations in the more developed mind. These functions are relatively independent and cannot be so adequately measured by a test as the various manifestations of intelligence can be measured by an intelligence test.

Another reason for small correlations in vocational psychology is that the tests are always given to selected groups. It is no good testing for experimental purposes all those wishing to enter some occupation, for there will be no industrial records of those who are not accepted. Candidates are always accepted by some selective means such as an interview or an examination ; moreover, there are always unconscious selective influences at work such as the state of the labour market, remuneration and social status. The result of this is that the subjects form a selected group which has the effect of definitely lowering the intercorrelations of any tests involving the functions affected by the selection.

The objective criteria with which psychological tests are correlated and their value determined for prognostic purposes are often less accurate

than the score of the tests. Sometimes it is not possible to get any more reliable measure of industrial proficiency than the opinion of an overseer, and such opinions are apt to be influenced by many extraneous factors which detract from their value as measures of industrial proficiency. Sometimes the output or earnings of the operatives are taken as a measure of their ability, but these are often determined by factors outside their control, or by a general standard that it is customary to reach in the particular occupation. Even when the measure is more objective, such as a trade test, it is sometimes found that the frequency distribution throws grave doubts upon its accuracy. This is not always the case and there can be no doubt that such objective measures, if they can be obtained, are the most satisfactory, but they should always be carefully examined.

Of the given reasons that may explain the small correlations obtained in vocational psychology only the first and last can be overcome by the psychologist. The mental differentiation arising in adolescence and the effect of selection are inevitable difficulties in vocational psychology. It is true that the effect of selection can be corrected if the standard deviation for the test score in some unselected group can be obtained. If this is possible, the theoretical correlation can be calculated and compared with the observed one. It is interesting to do this if it is possible, but the fact still remains that in the practical application of any tests we shall still be dealing with a selected group.

The vocational psychologist can do something to satisfy himself that the objective criterion is as reliable as possible. The frequency distributions of such criteria should always be examined; it may be possible to test their reliability by ordinary statistical methods and when this is done quite surprising results are sometimes forthcoming. An objective criterion should never have an accuracy attributed to it that it does not in fact possess, and it is sometimes desirable to compare test scores with industrial proficiency by the biserial or fourfold methods of correlation or by contingency tables. Such methods should not be resorted to unless the data make it necessary, but it is better to get a rough method of measuring consilience than one that is seemingly more accurate but that is not warranged by the data.

III.—THE SUPERIORITY OF COMPLEX VOCATIONAL TESTS OF INDUSTRIAL PROFICIENCY TO SIMPLE TESTS.

The test method in vocational psychology, except in the case of intelligence tests, is the direct outcome of laboratory methods. Laboratory technique is designed to measure psychological functions as far as possible

in isolation, and the same principle has to a large extent dominated vocational testing. Tests have been given to measure such factors as intelligence, reaction time, and perceptual discrimination in isolation in so far as this is possible, and then a final weighted score has been obtained by combining the scores of such tests weighted according to their regression coefficients on the criterion. By this means a higher correlation between the final weighted score and the criterion is obtained, but this correlation is usually such as to leave no doubt that many factors involved in proficiency have been left unmeasured.

The opinion is now gaining ground among vocational psychologists that the best results will not be obtained by this method. Complex tests involving more than one function in their performance have been found to yield higher correlations with industrial proficiency than those yielded by the combined score of the tests measuring in isolation the functions involved in the complex tests. It may be that even when the test scores are combined according to their regression coefficients on industrial proficiency they fail to measure some factor that is present when a task is done that involves the integration of the functions that have been separately measured. This explanation assumes that there is something more in a thing as a whole than the sum of its constituent parts, and certain results of vocational testing have been taken by some as evidence in favour of the Gestalt theory. This may ultimately turn out to be the case but it would be unwise to assume it at present and so allow vocational psychology to be dominated by a particular psychological theory; it is better to keep experimental psychology free from the influence of such until the theory is substantiated by overwhelming evidence. The fact that more complex tests tend to yield higher correlations with objective criteria may be because they involve some special ability of wider generality than any involved in tests measuring isolated functions playing a part in the complex test. This ability may correlate with several different functions and yet be something other than those functions dealt with as a whole. The influence of these two explanations of the fact that complex tests yield higher correlations than simple ones can be traced in the present main line of development in vocational psychology, for the tendency now is to use sample and analogous tests, and tests for special abilities involving several functions rather than tests involving only simple and isolated functions.

IV.—Sample, analogous and general analytic tests.

Sample tests, as the name implies, are sample processes in the occupation used as selective tests. The sample test is the simplest

form of vocational test and so has much to recommend it; on the other hand it has definite limitations. In the first place it can only be applied to occupations of a simple repetitive nature and there are few occupations that are so uniform as to be adequately represented in a single sample test. If several sample tests are given, testing may become a rather lengthy matter and so lose the simplicity which is the chief recommendation of the method. The main difficulty in sample tests goes deeper than this, however, and is intimately connected with the nature of habit formations. These tests are usually given to those already employed in an occupation, and when a high positive correlation is obtained between a sample test and proficiency in the occupation it is assumed by some that the test is suitable for diagnosing ability to do well in the occupation. This, however, does not necessarily follow, and sometimes sample tests that have yielded high positive correlations among workers already employed in an occupation have yielded insignificant correlations when applied to applicants for employment with no previous experience. Sample tests measure proficiency in an acquired habit but they do not measure the ability to acquire the habit, as is often assumed. When a sample test is given to those who have had no experience in the trade of which the test is a sample process, they are presented with a new situation, and whether they will be able to deal with it, and so score highly in the test, will depend upon factors which may be involved only to a small extent when the process if performed by a skilled worker. It has been argued that those who do well in a sample test are likely to form easily the habits necessary in the occupation, but this has never really been proved, and it never will be until sample tests have been given with satisfactory results to applicants with no experience in the trade, and not merely to those who are already engaged in the occupation.

Analogous tests are based upon the same principle as sample tests; by means of them an endeavour is made to reproduce mental reactions or movement cycles analogous to those involved in an occupation rather than to test particular psychological functions. They differ from sample tests inasmuch as they are not processes in the occupation but tests involving analogous situations to those presented in the occupation. Their use is limited to those occupations that are mainly composed of operations that can be satisfactorily reproduced in test form. The assumption underlying their use is that a task analogous to one in an occupation will involve the same psychological functions in its performance when done by a wholly untrained person as are involved in the task to which it is analogous when performed by a trained operative.

It is difficult to devise tests that are truly analogous, for even if they are superficially so we cannot be certain that they involve the actual psychological functions involved in the industrial task. The experienced worker depends so much upon kinæsthetic associations minutely adapted to his habitual occupation that it is difficult to see how these can be brought into play in the wholly new situations presented by an analogous test to an inexperienced person.

General Analytic Tests involving psychological functions of wide applicability are now being developed along more complex lines than previously so as to test highly organized functions. With adults simple sensori-motor tests have been found not to correlate among themselves or with objective criteria, whereas sensori-motor tests of a more complex nature do, so that the tendency now is to develop these more complex tests. Such tests do not measure functions in isolation, for they correlate with tests measuring other functions, although they may have a relation with objective criteria independent of this relation with other tests. Mechanical ability and aptitude, form relations, perseverance, and complex sensori-motor co-ordination are among some of the factors that are being specially investigated by means of what may be called general analytic tests because the object of such tests is to measure functions that are common to many situations, whereas the object of sample and analogous tests is to measure factors specific to particular occupations. Experimenters using these tests are endeavouring to make a systematic study of mental integration as the basis of a vocational psychology of wider application than is possible by means of sample and analogous tests.

The assumption underlying the use of general analytic tests is that they measure functions involved in the habit formations of the experienced workers, and that if an individual possesses such functions in a high degree he will be able to develop more proficient habit formations than an individual who possesses them in a lower degree. Although general psychological functions may be involved in proficiency in an occupation, such proficiency may be determined more by specific than by general factors, and if this is the case analogous or sample tests would probably be a better way of measuring it.

It would be idle to enter into any discussion as to whether sample, analogous or general analytic tests are likely to yield the most fruitful results, for the data concerning them are not yet sufficient to warrant it, and moreover it can be wholly obviated since the matter is open to direct experimental proof. The three kinds of tests can be given to groups of applicants for employment and their subsequent industrial proficiency compared with their performance in the three kinds of tests.

Even if sample and analogous tests yield significantly positive correlations with an objective criterion it does not follow that they do so on account of their resemblance to the mental reactions and movement cycles involved in the occupation. It may be because they involve some general psychological functions also involved in the occupation. How far this is so can be determined if general analytic tests are given in conjunction with the sample and analogous tests. Results obtained by testing experienced workers, although they may indicate the right line of approach, can never be regarded as evidence that they will be equally successful if applied to new entrants. Such tests can only be standardized and used for practical purposes if it can be shown experimentally that they have selective value when applied to applicants for employment with no previous experience of the trade they are being tested for.

Whatever the ultimate conclusions that may be arrived at as to the value of the three kinds of tests, it is clear that sample and analogous tests can never be of much value for vocational guidance, or for the more skilled trades that involve so many different operations as to make their representation in test form an impossible task. The number of occupations is so multifarious that it would be impossible to test those seeking vocational guidance with all the specific tests for all the possible trades they might enter. If, however, by means of general analytic tests, knowledge is gained as to the relative demands made by certain types of occupation upon certain general psychological functions, then children can be guided by means of such tests as to the best avenue in which to seek employment.

V.—CONCLUSION.

Within the limits of a single article it is impossible to pursue the subject further, as it would lead us into a consideration of nervous stability, temperamental differences, incentives, special interests and desires, and open up the whole field of vocational guidance. These factors play such an important part in vocational psychology that it is better to leave them untouched rather than deal with them in a superficial way. Moreover, it is more suitable to deal with them under the heading of vocational guidance, which is so closely linked to educational psychology and may ultimately play a large part in our educational system. As a method of portraying the present position in vocational psychology it appeared best to defer a consideration of vocational guidance until vocational selection had been dealt with. Selective tests furnish much of the scientific basis of vocational guidance so that the latter subject cannot be adequately treated without understanding the results and limitations of vocational selection.

In conclusion, it may be said that vocational selection is a branch of applied psychology the value of which has already been demonstrated, and which is likely to be greatly developed in the near future. The severe criticism to which its methods have been subjected has served to rid it of many spurious excrescences and to establish it on a firm basis. Systematic experimentation has revealed certain sources of error inherent in some of the early work, and these are not likely to recur, for the technique of the study is now more severe. There is no indication that selection tests will ever yield correlations so high as to approximate to complete agreement between test scores and industrial proficiency. Such a degree of agreement implies that by means of a few tests the total subsequent reaction to an industrial environment of each individual tested can be determined absolutely. Such a claim has never been put forward on behalf of any other selection methods and there is nothing to justify the claim on behalf of psychological methods of selection. Candidates are often selected for employment by means of medical and scholastic examinations, but it is not claimed that there is an exact agreement between a candidate's degree of medical fitness or scholastic ability and his position in a measure of industrial proficiency. All that is said in favour of these methods of selection is that experience has shown that on the whole those below a certain standard of medical fitness and scholastic ability do not do well in some particular occupation. Psychological methods of selection should be adopted if, and only if, it can be shown that by adding them to, or substituting them for, the present method of selection, those selected are on the whole more proficient than those selected by non-psychological methods. On the other hand psychological tests should not be rejected because they are unable to fulfil the extravagant claims put forward by certain enthusiasts that by means of them it is possible to determine absolutely each individual's degree of industrial proficiency. If by their use the industrial population can on the whole be better adjusted to its environment than is at present the case, then they will have served a useful purpose in social life. There is strong evidence that this can be done, so that those working in this field of applied psychology have much to encourage them, and should not allow themselves to be deterred because absolute determination of each individual's industrial proficiency is impossible by psychological or any other form of selection tests. Partial determination which can be shown to approximate more closely to complete determination than that obtained by other methods is a real gain and an ample reward for the effort expended in the study of vocational selection.

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RÉSUMÉ.

LES TENDANCES ACTUELLES DANS LA SELECTION PROFESSIONNELLE.

La sélection professionnelle a dépassé le degré initial, où il fallait démontrer la possibilité de mesurer, au moyen de tests psychologiques, certaines aptitudes impliquées dans la productivité industrielle. Actuellement l'attention se porte plutôt sur l'examen critique de sa technique et sur l'expérimentation avec des types divers de tests. Il existe une tendance à remplacer des tests visant à des fonctions psychologiques autant que possible isolées, par des tests plus compliqués, entraînant plusieurs fonctions réunies.

Ceci se manifeste dans l'emploi croissant de tests d'échantillonnage et d'autres analogues et aussi de tests généraux analytiques, entraînant des fonctions compliquées

plutôt que des simples. On ne doit s'attendre à ce que des tests individuels professionnels donnent jamais de hautes corrélations, telles qu'on en trouve entre les tests d'intelligence et l'accomplissement scolaire, puisque la productivité industrielle est déterminée par des variables nombreuses, dont aucune ne joue un rôle aussi décisif que l'intelligence dans l'accomplissement scolaire. Les tests psychologiques ont neanmoins une valeur considérable, comme ils indiquent plus de travailleurs productifs que toute autre méthode de sélection, et jugé par ce critérium, ils se sont déjà justifiés. Cependant il faut des recherches encore plus étendues avant qu'on ne puisse les utiliser de la façon la plus avantageuse.

ÜBERSICHT.

HEUTIGE RICHTUNGEN IN DER BERUFSWAHL.

Die Berufswahl hat ihr Anfangsstudium hinter sich, worin man noch beweisen musste, dass es durch psychologische Tests möglich ist, gewisse Funktionen zu messen, die in industrieller Tüchtigkeit enthalten sind. Zur Zeit bemüht man sich hauptsächlich deren Verfahren kritisch zu beurteilen und mit verschiedenen Testsorten zu experimentieren. Es besteht eine Tendenz auf Tests zu verzichten, die möglichst isolierte psychologische Funtionen zum Besten komplizierterer Proben umfassen, die mehrere integrierte Funktionen enthalten.

Dies wird durch die vermehrte Anwendung von Stichproben—(sample) und ähnlichen Tests und auch allgemeinen analytischen Proben, die verwickelte vielmehr als einfache Funktionen enthalten. Es ist nicht zu erwarten, dass einzelne Berufsproben hohe Korrelationen je ergeben werden wie man sie zwischen Intelligenzprüfungen und Schulleistung vorfindet, weil industrielle Tüchtigkeit durch viele Variablen bedingt wird, wovon keine eine so überwiegende Rolle spielt wie die Intelligenz bei der Schulleistung. Psychologische Tests werden eben so wertvoll sein, insofern sie tüchtigere Arbeiter aussuchen als irgendwelche alternativen Wahlmethoden, und wenn man sie dieses Musters eingedenk beurteilt, so haben sie sich schon gerechtfertigt, obgleich noch mehr Untersuchung nötig ist, ehe man den vollkommensten Gebrauch davon machen kann.

EDUCATION OF CHILDREN UNDER SEVEN YEARS OF AGE.

A.—Memorandum submitted to the Consultative Committee by the members of the Education Section of the British Psychological Society.

B.—Evidence submitted by Susan Isaacs.

(1) The following suggestions are confined to the psychological aspects of the questions which the Consultative Committee is considering, since other bodies will doubtless be offering remarks upon, e.g., the administrative aspects. In saying this, however, we should like to suggest that there are very few practical questions of education, even those on the administrative side, which do not in the end come back to the facts of child psychology. Whatever may turn out to be *practicable* in view of, e.g., financial limitations, the determination of what is *desirable* in the education of young children is fundamentally a psychological problem. We should like to emphasize our view that every sort of educational practice, whether it be new-fashioned or old-fashioned, is necessarily based upon psychological theory, even though this be implicit and unrecognized. In urging, therefore, that the psychological aspects are the most fundamental, we are not so much suggesting that educationists should *adopt* a psychological point of view (since this happens in any case), but rather that the psychological assumptions on which educational decisions are in fact based should be criticized for their own sake, and brought into line with the views now generally held by professional psychologists.

(2) It seems to us of the first importance that the years from two to seven should be considered as a single educational unit, and that the educational provision should be based upon the developmental needs of the child considered from the psycho-biological point of view. Whatever education the child receives at this age should be as continuous as possible, and transition from stage to stage should be easy and natural. There is no evidence to justify the idea that any drastic change, either in rate of development or in kind, takes place to coincide with the changes in school life which external organization now compels at about the ages of five and seven. The abrupt step from nursery to infant school, involving

too often complete change of physical and personal environment and consequent mental and emotional adjustment, is very harmful, especially when it is to be repeated in two years' time on promotion to the junior school. The children whose adjustments are slow will suffer most, but for all children there is the danger of present retardation and future maladjustment.

It would be advisable too that the break from the infant to the junior school should be determined by mental and physical age rather than by chronological age. In many districts the age of promotion is arbitrary—very often 6 years 9 months—which means that children who are still mentally and physically infants are forced to undergo the strain of attempted adjustment to junior school standards. This point has been emphasized in the Primary School Report, but such a policy of arbitrary promotion obviously affects still more the school which has to prepare children to reach a forced standard.

(3) We should like also to emphasize the fact that the medical supervision of children under seven, with regard to such points as weighing and measuring, testing of eyesight, and the provision of proper food, rest, recreation, and fresh air, is itself of the greatest psychological importance. The mental health of the child necessarily rests upon its bodily health, and one cannot begin to consider education in the broader sense until physical hygiene has been provided for. Moreover, all the necessary training in personal care of the body, habits of cleanliness, of feeding and of rest which the physical health of little children requires, are themselves to be looked upon as psychological problems, needing a true understanding of the child's mind, and a considerable educational art.

(4) We should like to point out how important from the psychological point of view are such questions as (*a*) adequate space for movement, for group activities, for practical work, and for free play; (*b*) every detail of furniture and equipment; and (*c*) the size of classes. However able and willing a teacher may be, she cannot provide the educational atmosphere in which children under seven can thrive unless she has plenty of room, and the right sort of playthings and didactic material, and unless the number in her group is small enough for her to give individual care to each child. Whatever may be true of older children, mass methods with younger children are entirely non-educational. Without the opportunity to run and jump and climb and play actively with his fellows the child under seven cannot develop skill and poise, or social co-operativeness. A good hall is thus quite essential in any school for young children, and every classroom should be large enough to allow for free movement.

Some sort of garden with a grass plot and the opportunity to dig and sow seeds is also very desirable in the education of children under seven.

The individual attention which children under seven need from their teachers (the younger ones in, e.g., training in personal hygiene, the older in the first use of the formal tools of education) is the chief justification for the demand for small groups. The opportunity for group activities in song and dance, rhythmic movement, games and dramatic play is, however, equally necessary. And all these things require the provision of adequate room and of light tables and chairs that can be moved and rearranged by the children themselves. As Dr. Montessori has shown, even very little children can be trained in the practical care of their surroundings, and such training is one of the most valuable means of general education in these years.

Another very important consideration with regard to size of classes is the fundamental need of young children for freedom of speech. It is fruitless to insist on a dumb tongue in these early years, and then look for an eloquent pen in the junior school. One of the most valuable things the school can do for these little children is to train them in the use of their mother tongue. But this cannot be done by formal lessons, nor, essential though it be that the teacher herself should speak clearly and correctly, can it be achieved by the children's passive listening to her. Active free interchange of talk in their play in the nursery school years, and open discussion in the class in the infants' school period, are the most valuable means, not only of gaining verbal facility, but also of ensuring clarity of understanding. But all this necessitates small numbers of children in any one class. Freedom of speech cannot be given to a large group of little children.

Thus, whilst the constant demand for fewer children in the classes, fewer regulations, and so on, may grow monotonous, the reasons for it are very serious. There are thousands of teachers, especially young ones, who want these practical alterations in routine work so that they may have more time to study the children with care, and to co-operate with parents, medical officers and welfare workers, in giving individual consideration to each child.

Co-operation with parents is difficult, chiefly because of numbers. An infant teacher with a normal class of, say, fifty, may want to know the parents of the children in her class—but there are one hundred of them!

(5) The chief means of education with children of these years is their own active and spontaneous play. Nothing we say to them can have the same value as their own active experience in the natural forms of

play. And this most significant psychological fact not only underlies the demand for plenty of room, but also shows the foolishness of any fixed time-table, particularly in the earlier years of the period. The play of children under five ought to be literally and entirely free. There should be no determination of what they are doing at any given moment except by the natural development of their own interests (apart, of course, from the routine of meals, etc.). Even with children of five to seven, whilst it may be useful to have a broad plan of work for the week, yet this should be held with the utmost elasticity. It should be looked upon as merely a useful guide, one that may be altered or discarded whenever this seems wise. One particular point that may be made is the discrepancy between a young child's powers of sustained attention and the type of time-table which is still too often found in infants' schools.

The division into short periods of ten and fifteen minutes is often a source of distraction to the child, and prevents the exercise of spontaneous attention, which could often be continued for longer, and which forms the basis of the later developing voluntary attention. On the other hand, it would be most unwise to attempt to compel little children to attend to the same thing for longer periods. In fact, the only safe ground for fixing the length of time given to any one occupation even in the infants' school is the natural inclination of the children.

(6) With regard to the more formal education of the older children in reading, writing, and arithmetic, it is here that " individual " material, allowing each child to go at his own pace and to work according to his own needs, is so essential. Mass methods are even worse than useless here, since they so often lead to the initial difficulties of a particular child being entirely overlooked and his development in reading and arithmetic thus being held up, perhaps for years. The work now being done at child guidance clinics in the diagnosis and remedial training of educational backwardness has shown how frequently retardation in particular subjects (as distinct from all-round backwardness due to poverty of intelligence) is to be traced to early confusions of the child undiscovered by the teacher. And she could not discover them because of the large number of children with whom she had to deal.

We should like to suggest, too, that reading and writing and arithmetic should not be suddenly and formally introduced at a given age, but should be brought to the child's notice first in play and games, and in connection with his practical interests in making things. Once the interest in these subjects is stirred, the child can be led on to more formal work by proper individual material, with a clear understanding of each new step.

(7) Even, however, with plenty of individual material and groups small enough to make individual attention possible, it is nevertheless advantageous that the groups themselves should be reasonably homogeneous, and bear a close relation to the variation in ability amongst the children. Individual differences in ability may not be as wide or as significant in these years as they are in the junior school, but they nevertheless exist and to a sufficient extent to justify attention. This is, of course, more true in the years from five to seven than earlier, partly because more formal grouping is then more useful.

There is, however, a great need for further research in the matter of mental tests for young children. The Binet scale cannot be considered reliable or indicative for children under five, but tests of the "performance" type, such as the Merrill-Palmer scale, would be found extremely valuable for grading amongst even the nursery school ages. But there should not be any hard-and-fast classification and *fixed* grouping, even on the basis of mental tests.

(8) All the above considerations lead finally to the fundamental question of staffing. It is most desirable that it should be generally recognized not only in words but in the deed of actual status and payment that the education of young children demands as much intelligence and skill and as highly specialized a knowledge as that of children in the junior or secondary schools. The range of knowledge required differs from that of the specialized teacher of history or mathematics, or that of the class teacher in the junior school. The teacher of young children needs at least as much knowledge of psychology, biology, and physical hygiene as teachers of older children. And in addition she needs a highly technical training. Her work demands not only wide and thorough theoretical knowledge, but also the ability to use it in concrete situations from moment to moment with particular children. And this is partly a question of natural gifts, but partly also one of experience and training.

(9) In conclusion, one of our members has suggested how very valuable to the teachers in the nursery school would be a close association with a child guidance clinic. The help would come not only from the actual difficult cases dealt with at the clinic and the improvement in particular children. Even more valuable would be the feeling of the ordinary teacher with an ordinary training, when she is trying to deal with the idiosyncrasies and social problems of her children, that she has skilled help available. The fact that there are people who think that the personal and emotional aspects of her work with the children (so easily overweighted and crowded out by scholastic routine) sufficiently important to be a highly specialized, whole-time job, will help to prevent their neglect.

Such clinics, with perhaps visiting advisers to the school, might be a constant support to the harassed class teacher in her effort to remember the importance of mental health.

SUSAN ISAACS, *Chairman*
EVELYN M. LAWRENCE, *Honorary Secretary (British Psychological Society, Education Section).*

B.—EVIDENCE SUBMITTED BY SUSAN ISAACS.

I have selected a few of what seem to me the more important broad issues in the development of educational provision for children up to seven years.

I.—The years from two to seven as a single period of development.

The period between two and seven years needs to be considered as a whole, a single problem of bio-psychological development. Children between two and seven have certain broad common needs which are more important than any detailed differences between what are called the nursery school and the infants' school periods. Such differences exist, but are not enough to justify a hard and fast division into different sorts of schools, nor any radical changes in atmosphere and method. Three sub-periods can, however, be distinguished, calling for a certain amount of change in handling.

(1) Two to three years—when the child still clings naturally to his mother or nurse, sphincter control is easily disturbed, bodily poise is insecure, manual skill and language are very limited.
(2) Three to five years, when poise and skill and language are more firmly based and rapidly growing, and social independence is a real possibility.
(3) Five to seven years, when the child is normally beginning to seek (to some extent) definite tasks and definite teaching, and can fit into ordered group activities somewhat more continuously.

Ideally, then, educational provision for the years from two to seven should be dealt with as a whole, and under single control. This would, however, only *be* an ideal arrangement if the whole problem were considered entirely afresh, starting without prejudice from the basis of the actual bio-psychological needs of these years. Single control would not be desirable if it meant subsuming nursery schools under the existing traditions of infants' schools. Any risk of this would prove it better to keep nursery schools entirely independent.

The main danger attaching to nursery classes, as compared with nursery schools, is just this risk of the whole approach to the child's problem being coloured by the traditional atmosphere of the infants' school, with all its inhibitions and false abstractions. If this were to happen, the life of the nursery school would be crushed under the weight of the infants' school, junior school, and senior schools acting from above downwards, instead of the nursery school being an active regenerating influence working upwards. As examples of the wrong approach to the education of little children which the tradition of the existing infants' schools would commonly bring, one might take such points as the relative inactivity and relative (or complete) silence expected from the children; the fixed time-table; the solid desks orientated to the teacher on the assumption that she will dominate the activities of the group as a whole, and far too heavy for the children themselves to adapt to temporary groupings for temporary pursuits; the far too large classes*; the inaccessible material in cupboards; the paucity of large play apparatus (slides, climbing cages, etc.) in hall or playground, and the general atmosphere of rigidity. Or one might take such a fundamental point as the provision of sanitary and washing equipment. To meet educational needs, this has to be planned properly from the start. It should be close to the playroom of each group, adequate in type, size and amount, and so arranged as to make supervision and training easy, and to foster social skill and independence among the children, as well as hygienic habits. Lavatories and wash-basins are as much a part of the *educational* equipment of a school for young children as material for handicrafts and reading and writing. But this is not the point of view expressed in the equipment in existing infants' schools, and is something quite foreign to their notions.

This particular point is but one illustration of the fundamental truth that throughout the years under seven the physiological and psychological aspects of the child's development are inextricably interwoven. And this leads on to the problem of what kind of *training* is required for those who are to be in charge of children under seven.

II.—The training of the staff.

(*a*) The unity of body-mind development in the earlier years points to the fact that neither the mere nurse nor the mere teacher is adequate

* I consider it very important that the *unit* groups with children under five years should not be more than ten or twelve children, whatever the size of the nursery school itself. In particular, children of two to four years should not be plunged into a group larger than this, on first entry.

to deal with children under seven. Each has her own prejudices, detrimental to full understanding of the child. The nurse typically overlooks all the psychological factors in bodily hygiene, whether training in cleanly habits or in a satisfactory routine of feeding. On the other hand, the teacher commonly overlooks these physiological problems altogether, regarding them as something to be got out of the way as quickly and perfunctorily as possible. She tends to think of the child only in terms of measurable progress in conventional academic pursuits. A new approach freed from both of these attitudes is indispensable.

(*b*) A sharp division into nursery school and infants' school teachers in training is again unwise. It is true that a little more emphasis can be laid on the nursing side for those dealing with children under five, and on the scholastic side for those in charge of children between five and seven. But such emphasis or selection of studies should not over-ride the great field of common knowledge and common understanding which all teachers of children under seven require.

One point, however, needs specially to be noted with regard to teachers of the younger groups—that is, the importance of *temperament*. For those dealing with children of two to four, this is quite as important as theoretical knowledge. No one can be helpful to little children who is not inherently stable in temperament and able to rely upon her own intuitions and spontaneous responses to the children.

(*c*) An adequate knowledge of child psychology is, nevertheless, of the greatest help to all teachers of children from two to seven.

III.—The psychology that is needed and can be taught.

(*a*) I do not consider that the general and theoretical psychology of the ordinary text-books is either necessary or helpful. Young teachers and students in training cannot relate the technical terms and generalized discussions of the text-books to their immediate perceptions of the children, or to their concrete responsibilities to them. What is needed is perfectly simple, direct descriptions and observations of the actual behaviour of children. These can then be illuminated by discussion of certain of the broader psychological concepts, such as instinct, habit, thought and phantasy. These need to be discussed, largely because they are notions in any case current in everyday thought, often, of course, with a false psychology attached to them, of a kind that will actually affect the behaviour of grown-ups towards children.

For example, I am constantly finding that both teachers and nurses (and doctors) place a great deal of weight upon the notion of "cultivating good habits," without any adequate understanding of what habits are

in relation to (*a*) the spontaneous impulses and emotions of the child; and (*b*) the natural phases of his growth. Habits are thought of as a kind of mechanism which can be given to the child in a lump, here and now, instead of as a complex problem of growth. Many evil things are done to little children under the fetish of "forming good habits." Much the same thing might be said with regard to "obedience."

Again, I think it very important for teachers of young children to realize that the young child has as much need to make-believe as he has to think and speak and develop his bodily skills. And some understanding of the *relation* between thought and phantasy is needed, if only to break down the idea that there can be a rigid division between them, and that the child can think or imagine according to a fixed time-table.

Another essential for those in charge of young children is to appreciate something of the way in which all the child's activities are from an early age infused with the reasoning process in essence, although his ability to reason changes in form and scope as he grows.

These are but instances of those broader aspects of the child's *intellectual* growth, having an intimate bearing upon the creation of a favourable environment, and understanding of which can in fact be given to young teachers in quite simple and concrete terms.

(*b*) Another essential piece of knowledge is that of the *norms of development* throughout the period, with regard to every aspect of growth, whether control of the excretions, manual skill, bodily poise, perception, social responses and independence, language and thought.

(*c*) Finally, it is of the greatest importance that those who are handling little children should have some insight into their emotional problems and early conflicts with regard to the family situation. Without this, it is not possible to give them the help and support they need at critical moments of stress. The successful teacher or nurse of young children will have some intuitive understanding of these problems by nature; but a more deliberate understanding based upon wider observations and theoretical discussions is needed if she is to find the best positive technique for dealing with such difficulties as fears and tantrums and aggressiveness, and the other emotional crises constantly arising among a group of tiny children.

THE MALADJUSTED CHILD.*

By G. A. AUDEN.

I.—*Maladjustments—a typical case. Analysis of the causal factors involved. Frequency of maladjustments in childhood.*

II.—*Man a social animal. Survival-value of primitive social instinct. Protopathic and epicritic forms of behaviour.*

III.—*The child primarily a "self of enjoyment." Formation of a SCHEMA of personality in relation to the non-self world.*

IV.—*Plato and Aristotle as forerunners of Freud. The "pleasure principle and reality" conflict.*

V.—*Conflicts and their solutions.*

VI.—*Other types of maladjustments in children.*

VII.—*The "broken home" in relation to juvenile delinquency.*

VIII.—*Age of child in relation to delinquency. Delinquency as the overt expression of the repressed Unconscious.*

(I) A few weeks ago I was asked to see a little boy aged 8 years 3 months whose parents were in great distress because this, their eldest son, was so contrary and troublesome. Neighbours complained, they said, that he was always up to mischief, interfering with other children's games, and, in fact, if anything happened it was always put down to their boy. The situation was rendered more difficult by the fact that the father was a police constable, who was naturally expected by his neighbours to uphold the law at any rate in his own household. The boy now seemed to take a pride in being known in the district as a "bad boy." The boy was a delicate looking little lad, small for his age (4-ft. $2\frac{3}{8}$-ins.; weight, 3-st. $11\frac{1}{2}$-lbs.), who had a large empyema scar on the right side. He had been in and out of hospital for three years, including six months in the fever hospital for diphtheria, and had been always a delicate baby.

His intelligence and general response were extraordinary, and he read with facility and expression. Calculation was also quick, and, in fact, he was well in advance of his age. His school report was:

"He was admitted here on January 6th, 1930, after receiving hospital treatment either as an in-patient or out-patient for two and a half years, as a result of which he had been spoiled and allowed to have his own way. He is

* A paper read before the Education Section, British Association, London, 28th September, 1931.

a thoroughly intelligent boy, and has a mental age of 9 years 8 months. He is now working in Standard 2a, and will be transferred to the Junior Department in July for Standard 3. He is particularly interested in reading and the allied subjects, but dislikes singing and dancing. Consequently, he is sometimes excused from the latter subjects and allowed to read instead. In class he is quite well behaved and amenable to discipline, but once in the playground or street seems to have a superabundance of energy, which frequently causes trouble with other children. Although when at first questioned concerning his misdemeanours he is apt to deny having done anything out of the ordinary, he will always ultimately own up to it, and, on the whole, truthfully. There is absolutely nothing morally wrong as far as I can tell, but I realize that he is a born leader for good or evil in future years, and needs careful training."

His parents reported thus: "He has a little brother two years younger than himself . . . ever since he was a tiny tot he's been bitterly jealous. He used to do dreadful things; he lit some paper to burn him and would tip him out of his cot. He wasn't much more than two years old then. He's bitterly jealous of him now, and if we give his brother anything we've got to give him the same. We've had great complaints from the neighbours wherever we've gone. He's resigned to his fate that he's a bad boy. We daren't take him on a visit; we sent him to relatives, but they wouldn't keep him. He's bursting for adventure —he wants to be a sailor. He sticks daggers in his belt and pretends to be a Red Indian."

The boy quickly became communicative about his interests. "I want to be a sailor and go to Africa and India; they are both the same kinds of country, and there are all sorts of animals there—elephants and lions. I wouldn't like going in the long grass, because it would be over my head, and there might be snakes there. I don't play much with my little brother, because he always plays with the little boys, and I can't find him when I want to play with him. I play with the big boys." The small physique of the boy has taught him not to try conclusions with bigger boys, but to keep at a distance and throw stones. This has led to much trouble with the neighbours.

I have related this story at some length, not because it has any unusual features, but because it illustrates very typically the maladjusted child and many of the factors which go to the causation of the maladjustment.

Here is the first-born son of a couple, solicitous for the moral and physical welfare of their child, and with a strong sense of discipline and duty, intensified doubtless by the father's military training and employment. As an infant his delicacy demanded much attention, which continued until the birth of his brother, an event which brought

into the household a baby who necessarily usurped the place of the elder child in his mother's care. The elder boy thus found himself dethroned and no longer the centre of the little solar system round which the other members of the home revolved. It was, in fact, his first experience of the conflict between the pleasure principle and reality, and his "self of enjoyment" found itself thwarted and his "will-to-power" curtailed. He noted that this advent of his brother had diverted his parents' care and, seemingly, their interest. Accordingly, his conduct became governed by the idea of the removal of his rival. But this desire for the extermination of his rival has undergone a change into an attempt to secure the notice and attention of his parents by playing a part. His sense of failure in his attack upon the impregnable fortress of his parents' apparent predilection for his younger brother has brought with it a subconscious desire for revenge. "Revenge is sweet," and his behaviour is calculated to hurt and distress those who are the authors of his troubles. At the same time his ego-ideal has found satisfaction in the fantasy of adventure and freedom, rendered all the more real by the contrast between his quick intelligence and his puny bodily equipment. His desire for supremacy and power finds expression in the dislike of singing and dancing, mentioned in his school report, these accomplishments seeming girlish and infantile and so unsuited to a bold and venturesome spirit. This satisfaction is also evident in the pleasure brought by being the marked "bad boy" of the neighbourhood. Maladjustments of a similar character are extraordinarily common. The tragedy of their existence lies in the fact that they generally occur in homes where the parents are most anxious for the moral and social upbringing of their children, as well as for their material good, and to mould their characters into the pattern demanded by the community of which they are members. In the more free and usually more unfettered life of the slum, where the pressure of social dictates and inhibitions is less strongly felt, the maladjustments of childhood take on a different form.

It is, moreover, certain that that age-long desire for a life after death which made the Greek look to have an immortality realized through the lives of his children has moved towards a less material and more ethical longing, and to-day parents look to find in their children surrogates for themselves, and yearn to attain in their children's successes their own unattained ideals, and to see themselves mirrored as an image undimmed by the knowledge of their own shortcomings.

It will be of interest, therefore, to consider the psychological background of this form of maladjustment.

(II) Man is essentially a social animal,* and if the cohesion and compactness of the society in which he moves, and upon the integrity of which his safety depends, is to be preserved, he must subordinate his own individual interests and desires to the demands of the community as a whole. In other words, his own individualist outlook must be sublimated to one of altruism. Without such a subordination the society must disintegrate and dissolve. Primitive man was but ill-equipped by strength and agility for the struggle for existence, and it was only by combination into a society for mutual help and protection against his enemies that he was able to hold his own. Social life has thus a survival value. This is true even if it be granted that the presence of a proportion of rebels against the established order makes for social progress. Every child in the early months of his life is essentially individualist, or, in the words of Lloyd Morgan, "a self of enjoyment," but from his birth he is subjected to a ceaseless stream of suggestions of social import from his immediate environment which stamp upon the still plastic material of his mental make-up an impression which stands out ever clearer and in stronger relief with his increasing years. It is man's inherent suggestibility which gives to environment its supreme significance. These social demands are an epicritic form of mental activity and involve the suppression of the phylogenetically older protopathic instinctive reactions.†

* *Aristotle*, Politics, i, 2.

† Rivers, *Instinct and the Unconscious*. The terms "protopathic" and "epicritic" were introduced by Sir Henry Head and Dr. W. H. R. Rivers to describe two definite stages in the return of sensibility following the division of a cutaneous nerve, which appear to represent two distinct stages in the development of the afferent nervous system. Protopathic sensations are crude and vague, without exactness of localization or discrimination. They have a pronounced feeling-tone, generally on the unpleasant side, and the reactions which take place as the result are of the "all-or-none" type—i.e., it they take place at all they tend to occur in their full strength, without graduation according to the nature of conditions by which the behaviour is produced. There is thus a complete absence of proportionality between the behaviour and the conditions which call it forth. The resulting emotive reactions are immediate and unreflective. Epicritic sensibility, on the other hand, has a much more clearly defined and localizing character, which allows the nature of the stimulus to be recognized, and thus enables more complex and directive response and modifications of behaviour to be made, graduated in character in accordance with the nature of those conditions whereby it is produced. We may perhaps without flippancy apply Wordsworth's phrase: "nicely calculated less or more" to this type of reaction. Thus instinctive behaviour may be described as the summation of protopathic and epicritic reactions to the stimuli which pour in upon us from moment to moment. (*cp. Auden: The biological Factors in Mental Defect. Psyche.*, Vol. V, pp. 240-256.)

"Rivers came to suppose that the instincts associated with the needs of the individual and with the early preservation of the race are mainly of the protopathic kind, whereas the epicritic group of instincts first appeared with the development of the gregarious life." (Myers: Presidential Address, British Association Psychology Section. I. (1922).)

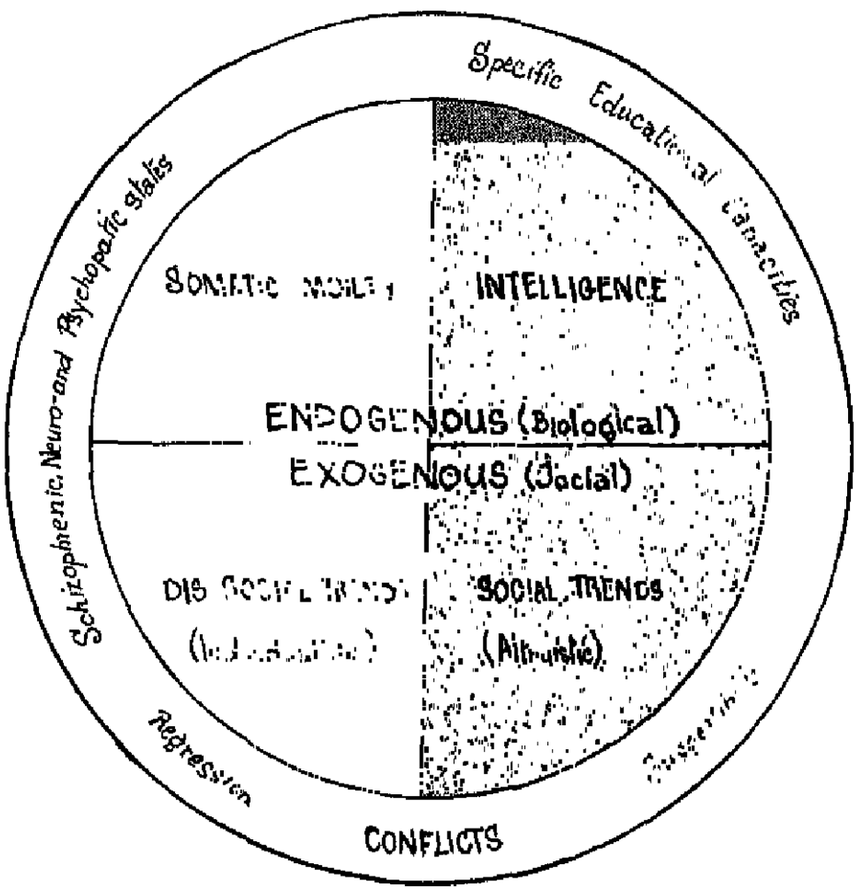
(III) As the late Dr. Mercier pointed out,* the strength of an instinctive tendency is in proportion to its antiquity in the race in which it exists. There thus arises a conflict between the two forms of reaction and there is, therefore, small wonder that in this conflict, especially in the child, victory often goes to the earlier—i.e., the protopathic individualist reaction. It is out of his experience of living that the child forms an ideal construction or *schema* of his individuality in relation to the non-self world. This *schema* includes the external world of matter, space, and motion, in which his body has place, and, based upon epicritic data, a world of social import in which other conscious beings have place, and to which those personal experiences which constitute his incipient *schema* of self have reference. The *schema* of the personal self thus formed constitutes the ego.

> "In its contact with reality," writes Freud, "the ego learns that it must go without immediate satisfaction, learn to endure a degree of pain, and altogether forego certain sources of pleasure . . . it becomes reasonable, is no longer controlled by the pleasure principle, but follows the reality principle." †

(IV) This dictum is no new discovery, for Plato in *The Laws*‡ makes the Athenian stranger say: "Pleasure and pain I maintain to be the first perceptions of children, and I say that they are the forms under which virtue and vice are originally present to them." Thus "virtue" and "vice" are, after all, only the reflections in the *schema* of self of the social sentiment of the time and place. Aristotle, also, takes this view.§ "Moreover, to like and dislike the right things is thought to be a most important element in the formation of a virtuous character. For pleasure and pain extend throughout the whole of life, and are of great moment and influence for virtue and happiness, since men choose what is pleasant and avoid what is painful." With the increasing integration of his experience the child endows his ego-schema with all the qualities which his ego-centric orientation demands, and this is satisfied only if there is complete adjustment and coincidence between these qualities and the data of his social relationships. If the adjustment is imperfect, then a state of conflict is the result between the ego-schema and the environmental circumstances in which it is placed and which form its "frame of reference"—i.e., a conflict arises between the individualistic and the

* Mercier: *Crime and Insanity*, p. 27.
† Freud: *Introductory Lectures*, p. 299.
‡ Book ii, Section 653.
§ *Ethics*, x, I.I.

altruistic demands. The solution of this conflict may be by a regression to the more primitive and less integrated schema of a period anterior to the conflict—i.e., that of a "self of enjoyment" still untrammelled by the pressure of reality. Thus the conflict between the desire of acquisition of a coveted object and the categorical imperative, "Thou shalt not steal," may be solved in a manner satisfactory to the ego-schema by a regression to the period of childhood when the dividing line



The diagram attempts to represent the four-fold basis in character-formation. The upper two segments are the physical bodily basis and the general mental make up, both subject to the biological "laws" of heredity. These are endogenous or *intrinsic factors. The lower half represents the exogenous extrinsic factors* and the state of conflict which must arise between them. The shaded right semi-circle attempts to show the epicritic as opposed to the more protean protopathic elements in the unshaded left semi-circle. The outer circle represents certain associated elements. Thus the capacities for reading, calculation, etc., differ in character from, *but are associated with, the intelligence, while neuropathic and psychopathic states* have an association with the somatic factors. Schizophrenia may be represented as an extreme form of regression.

between "thine" and "mine" is unrecognized. Or the conflict may find solution, as it has in the case quoted, in the passage into a world of fantasy in which the ego-schema finds its aspirations fully realized, and with which

therefore, it is in complete harmony. To be a sailor and roam the world in fancied freedom is the natural aspiration of a boy, especially one whose imagination has been stimulated and his curiosity aroused by a quick intelligence and understanding, the more so when this fancied freedom stands in marked contrast with the discipline of home. To find himself in the jungle, pitting himself against those lords of beasts, elephants and lions, satisfies his "will to power." But to this picture there arises a contrast, one of limitation and fear—the lurking unseen snakes in the tall grass, which seems to hem him in and prevent escape. Father and neighbours have become to him symbols of an inexorable authority which stands between him and life, and the boy is, therefore, restless and unruly. He had been told that owing to his behaviour his parents would have to send him away from home. So far from being distressed he eagerly asked: "Will it be to a ship?"

(V) This authority-symbolization may have tragic results. A few years ago I was asked to see a boy of twelve, who since the age of five, after the birth of his brother, had never spoken to his father. Till this event he had been the idol of his father, who, in the mother's phrase, "slobbered over" his boy, who used to climb all over him when he returned from work. The second confinement coincided with an attack of whooping cough, and accordingly the boy was quickly driven off whenever he attempted to get into his mother's room to see the new brother, whose cries he could hear. From that experience dated his change of attitude to his father and to his two maternal aunts who came to keep house at the time. The boy said he wanted to speak to his father, who had promised him all sorts of rewards, but something stopped him, what it was he could not say. Here the trauma was deep, and in all probability permanent.

(VI) Here is a maladjustment belonging to a different category: R.P., aged 8 years 2 months, was seen by me on account of a sudden and persistent refusal to go to school, which had brought his parents before the School Attendance Committee. This quiet, thoughtful, but responsive boy, whose performance tests gave clear evidence of his intelligence and ability, had previously attended school with regularity and willingness. He had had an elder brother who had died, aged 12, three years previously of cerebellar tumour. To this boy he had been devoted, and used to feed him as he lay in bed. He felt his death very much. He had also a younger sister—an imbecile and quite unable to walk or talk—upon whom he lavished all his affection, running home

from school in order to play with her and take her in a little go-cart to a neighbouring park. One day on returning from school he found that his sister, aged 4½ years, had died suddenly in her mother's arms. The day after the funeral he refused to go to school, and being forcibly taken thereto with much struggling, was sick. On reaching school he cried very much, and vomiting again more than once, was sent home again. This occurred the following day, and in spite of punishment and persuasion he could not be induced to go back, hiding and playing truant whenever he could. In school he was constantly sick. He complained of abdominal pain, especially when he got to school. Nothing organic could be discovered either by me or at the Children's Hospital, to which I sent him. After talking to him I was able to persuade him to return to school, which he did with perfect regularity for nearly two years. In the meantime another brother was born, who became to him all that his imbecile sister had been, the "ideal companion" with whom he spent all his play hours. One Sunday evening, on returning home from a walk, he found a policeman and several people in the house, and his brother, now eighteen months old, stretched on a table. It appeared that a young girl, while carrying the baby, had slipped and, in falling, had broken the child's thigh. He was taken to the hospital. The next day there was a repetition of the refusal to go to school and the truancy reached such a pitch that the parents were threatened with legal proceedings. The question was now complicated by the fact that the little boy, having contracted scarlet fever in hospital, was transferred to the Fever Hospital, where he developed an acute nephritis and remained several months. The same symptoms recurred, and a bismuth meal and careful physical examination revealed nothing. He said: "School makes me feel as if I want to be sick."

My notes are:

"Good intelligence and response, says he is very fond of reading, and mother says is very helpful in the house. Father has thrashed him for not going to school and now the boy runs out into the street when his father comes home and is found crying in the street. When taken to school he ran away and was afraid to go home till 10-30 p.m. Very negativistic and silent this morning, and I can scarcely get a word out of him. Arthur is still away in hospital. The boy said: 'When he comes home I shall go to school.' Is evidently much frightened. On Thursday he swallowed some disinfectant after the school attendance officer had called, 'because I wanted to die.' Two days later got a bottle off the shelf and drank some of it. Fortunately it was only olive oil."

He was a pitifully distressed little lad at this time, and I excluded him from school. On the return home of his brother he went back to

school and continued for the rest of his school life to attend with perfect regularity. Since leaving school he has been in continuous employment in an engineering shop. He is a perfectly normal youth, keen on his work, studious and attending the technical college. Had it not been recognized that the conduct of this boy was the outcome of a psychical trauma it is probable that his persistent absence from school would have resulted in his committal to an industrial school. The case emphasizes very well the value of child guidance and the need for a psychological clinic attached to every juvenile court of justice.

Behaviour is the result of mental causes, of mental life, and no action is isolated but is bound to past experiences by an endless chain of causative factors, and is conditioned by the whole character of the individual. What these causative factors are it is our duty to try to discover, for then only can we hope to understand, and understanding, to help.

In the words of Aristotle : " We have sure knowledge when we know the cause."

(VII) Another fertile source of difficulty in the behaviour of children is the broken home with its attendant maladjustments. There is abundant evidence that the broken home stands in causal relationship to juvenile delinquency. This is proved by a recent analysis of the home circumstances of 200 juvenile delinquents. As will be seen from the accompanying Table 1, there were in this series 101 children whose home life had been broken by some adverse circumstance.

This 50 per cent of such cases is considerably higher than that of the distribution of broken homes in the community at large. This figure does not include the manifold forms of home maladjustments, which can best be described under the Continental term " *Elternkonflitek*," and are, as the cases I have quoted show, a fruitful predisposing cause of aberrant behaviour.

(VIII) This psychological background for delinquency is further well illustrated by the accompanying tabulation (Table 2) of the forms which the acquisitive propensities assume at different ages. Thus, under ten years of age the objects taken are, to a large extent, of a type which minister to the fantasies of childhood. The possession of a bicycle or a watch, for example, makes a much more direct appeal to the individualism of a small child than does the less immediate and more abstract conception of money value.

TABLE 1.

HOME CONDITIONS OF 200 CONSECUTIVE JUVENILE COURT CASES.

Age.	*Both Parents Dead.*	*Father dead.*	*Mother dead.*	*Parents Separated*	*Step-Father.*	*Step-Mother.*	*Illegitimate.*	*Living with relatives.*	*Normal home.*	*Total*	*Broken home.*
											%
Under 10 ..	—	3	3	—	—	—	—	—	14	20	30
10—12 ..	1	8	3	1	2	2	2	—	22	41	46.3
12—14 ..	1	9	2	2	2	1	4	1	33	55	40
14—16 ..	1	25	6	9	6	2	5	—	30	84	64.3
TOTAL ..	3	45	14	12	10	5	11	1	99	200	—

TABLE 2.

OFFENCES COMMITTED BY 200 JUVENILE COURT CHILDREN.

Age.	*Stealing Bicycle.*	*Watch.*	*Money.*	*Cigarettes.*	*Fruit, Sweets, etc.*	*Tools, Toys, Flash Lamps.*	*Breaking and Entering.*	*Sex Offence.*	*Total.*
Under 10	2	7	1	1	4	—	5	—	20
10—12	4	3	12	4	3	7	8	—	41
12—14	2	4	18	7	7	11	6	—	55
14—16	6	6	21	4	22	18	3	4	84
TOTAL	14	20	52	16	36	36	22	4	200

With increasing knowledge and capacity for the formation of more generalized judgments, money becomes more desirable, because it gives a sense of power and superiority, while the watch and bicycle continue to exercise their sway on the imagination. Flash lamps and bicycle lamps also are favourite articles at the age of ten to twelve for the same cause. After leaving school these are objects of utility, and money now has a definite commercial value, and accordingly these appear with greater frequency in the charges against lads between twelve and sixteen.

The misdemeanour known as "entering" or "breaking in" is often in the younger groups a resultant of the gang-spirit which is in essence the first stirring and forerunner of those instinctive tendencies towards group action which form the basis of our social life. This gang-formation itself, associated with our natural inherent suggestibility, may also often be evidence of a more systematised fantasy building than is found with younger children.

The juvenile misdemeanant, the difficult child, the "nervous" child, are, after all, but the overt expressions of something in the repressed unconscious of us all, and only by a frank recognition of this truth can we project ourselves into, and identify ourselves with, the children brought before us. Without this self-projection and identification we shall continue to grope in the dark in dealing with the difficulties and perplexities of childhood.

RÉSUMÉ.

L'ENFANT DIFFICILE.

Parmi les formes du manque d'ajustement chez les enfants il y en a une qu prédomine par sa fréquence, i.e., celle de l'enfant qui par l'arrivée d'un second enfant se trouve déplacé de sa position comme centre de l'attention de la famille. Le trauma produit par ce déplacement se manifeste dans une conduite qui cause chez le parent attentif, parfois trop consciencieux, beaucoup d'inquiétude.

La base psychologique de ce manque d'ajustment, et d'autres encore peut s'expliquer ainsi :

Pendant les premiers mois de la vie l'enfant est essentiellement un "moi de jouissance." Cette attitude individualiste est le résultat de sa compréhension croissante du contraste entre son moi et le monde qui n'est pas lui. Ses réactions envers le monde extérieur sont surtout de nature protopathique, mais il est exposé à une série ininterrompue de suggestions de signification sociale qui exigent une forme épicritique d'activité intellectuelle et qui entraînent la répression des réactions instinctives et protopathiques, plus anciennes du point de vue phylogénétique. "Il devient raisonnable et n'est plus guidé par le principe du plaisir mais suit le principe de la réalité" (Freud). Cette antithèse plaisir-douleur, énoncée par Freud, a été en son essence présagée déjà par Platon et Aristote. De son expérience de la vie l'enfant érige une construction idéale, un schème de son individualité dans son rapport

avec le monde extérieur. Ce schème comprend le monde extérieur de la matière, de l'espace et mouvement dans lequel son corps a sa place, avec un monde de signification sociale basé sur des données épicritiques dans lequel se trouvent d'autres êtres conscients. C'est ce schème qui constitue l'Ego." Il s'élève donc un conflit entre les deux formes de réaction et, puisque la force d'une tendance instinctive est proportionnelle à son antiquité dans l'histoire de la race, il est peu étonnant que chez les enfants la victoire tombe si souvent du côté de la réaction protopathique individualiste. Plus tard dans la vie la même victoire est souvent obtenue par une régression vers un schème moins complet d'un moi de jouissance, libre encore des exigences et des inhibitions sociales.

L'importance de ce point de vue se trouve dans le fait que le jeune délinquant et l'enfant difficile ne sont que des manifestations de quelquechose qui existe dans l'inconscient de chacun de nous et que c'est seulement en nous mettant à la place de l'enfant que nous examinons, et en nous identifiant avec lui, que nous pouvons arriver à comprendre les ressorts de conduite, quelque bizarres et désagréables que soient ceux-ci pour la société.

Une analyse du milieu social de 200 cas de crime juvénile démontre que 50% étaient associés à des " foyers détruits." De plus le type caractéristique de délit auxâges différents jette une lumière utile sur sa base psychologique.

ÜBERSICHT.

DAS SCHWER ERZIEHBARE KIND.

Unter den verschiedenen Formen der schlechten Anpassung bei Kindern tritt eine wegen ihrer Häufigkeit besonders deutlich hervor, d.h. die des ältesten Kindes, das sich von seiner Stelle als Mittelpunkt der Aufmerksamkeit bei seinen Eltern durch die Geburt eines zweiten Kindes verdrängt fühlt. Das durch diese Beiseitsetzung hervorgerufene Trauma hat oft ein Benehmen zur Folge, das den achtsamen und bisweilen übergewissenhaften Eltern viel Sorge bereitet.

Der psychologische Grund dieser und anderer schlechten Anpassungen mag folgendermassen erläutert werden :

In den frühen Monaten der Kindheit ist das Kind wesentlich „ ein Ich der eigenen Lust." Diese selbstsüchtige Einstellung ist die Folge seiner zunehmenden Wahrnehmung des Gegensatzes zwischen einer persönlichen und einer ausserpersönlichen Welt um es herum. Seine Reaktionen auf die ausserpersönliche Welt sind wesentlich protopathisch, aber es ist einem unaufhörlichen Strom von Beeinflussungen sozialer Art unterworfen, welche eine epikritische Form von Geistestätigkeit verlangen und welche die Zurückdrängung der phylogenetisch älteren, protopathischen instinktiven Reaktionen einschliessen. „ Es wird ein vernünftiges Wesen und ist nicht mehr durch das Lustprinzip gebunden, sondern folgt dem Wirklichkeitsprinzip " (Freud). Diese von Freud verkündete Lust-Schmerz-Antithese wird schon von Platon und Aristoteles in den Grundzügen geahnt.

Aus seiner Lebenserfahrung formt das Kind einen idealen Bau oder ein „ Schema" seiner Individualität der ausserpersönlichen Welt gegenüber. Dieses Schema umschliesst die äussere Welt der Materie, des Raumes und der Bewegung, worin sein Körper sich befindet, und eine Welt gesellschaftlicher Bedeutung, die auf epikritischen Gegebenheiten beruht, in der andere bewusste Wesen existieren. Dieses

Schema bildet das „Ego." Daher entsteht ein Konflikt zwischen den beiden Formen der Reaktion, und da die Stärke einer instinktiven Tendenz in einem Verhältnis zu ihrem Alter in der Rasse steht, nimmt es nicht wunder, dass die protopathische selbstsüchtige Gegenwirkung bei Kindern sehr häufig den Sieg davonträgt. Im späteren Leben wird dieser Sieg oft durch Zurückgehen auf ein weniger vollständiges Schema eines von sozialen Ansprüchen und Verboten noch ungefesselten Ichs der eigenen Freude davongetragen.

Die Bedeutung dieses Gesichtspunktes liegt in der Tatsache, dass der jugendliche Verbrecher und das schwer erziehbare Kind lauter offenbare Ausprägungen von dem sind, was im unterdrückten Unbewussten eines jeden von uns schlummert, und dass wir die Schwankungen im Benehmen eines Kindes, so seltsam und der Gesellschaft lästig sie auch sein mögen, nur durch eine Projektion und Identifizierung von uns selbst mit dem betreffenden Kind begreifen können.

Eine Analyse der sozialen Verhältnisse von 200 Fällen jugendlicher Verbrechen zeigt, dass 50% der Täter keine geordneten häuslichen Verhältnisse hatten. Ferner ermöglicht die Art des Vergehens in den verschiedenen Altersgruppen auch den damit verbundenen psychologischen Ausblick.

AN APPLICATION OF MENTAL TESTS TO UNIVERSITY STUDENTS.*

By H. D. JENNINGS WHITE.

(*From the Department of Psychology, University College, London.*)

Part I.

I.—*The "General Intelligence" Test and the results obtained from the different Faculties.*

II.—*Comparison of the results of the "General Intelligence" Test with the results of the ensuing examination.*

III.—*Cases of discrepancy between performance in tests and performance in university examinations.*

IV.—*An enquiry into the causes of the discrepant cases, a questionnaire on methods of work.*

I.—The "General Intelligence" Test, and the results obtained from the different Faculties.

Purpose of the enquiry.

At the commencement of each university session from 1922 to 1926, in October, the fresh students at University College, University of London, were given a "General Intelligence" Test, the total number of students tested being 1,840.

The construction of the test and the exact nature of the abilities tested are matters which do not form any part of the present enquiry. We are only concerned here with an enquiry into the reasons why some students do well in the test and fail in the examination in the ensuing June; while others do badly in the test and yet gain distinction in the examination in the ensuing June. As a preliminary, however, we are able to give some results indicating the way in which the various Faculties responded to the test. As shown in the table below, the "order of intelligence" of the various Faculties (ignoring those of which the number of students was less than 100) was as follows: first, Arts, then Science, Medicine, Librarianship, Engineering, and last, Fine Arts.

* This paper is an extension of a thesis approved for the degree of Ph.D. in the University of London. For further details the reader is referred to the Library of the University of London, where the thesis is deposited, and to a more complete account of the extended work in the possession of the Author.

Nature of the test.

The term "intelligence" is not here used in the popular sense, but as a technical term in the sense of general mental power or ability. The present writer took no part in the construction of the test, which was compiled under the direction of Professor Spearman. The test was of the same class as those usually called "General Intelligence" Tests. It consisted of: similars and opposites, verbal transpositions, analogies, mathematical problems, mixed relations, and general knowledge. All these tests were in the forms generally known. This test lasted one hour and carried 300 marks. *In addition* there was a supplementary lasting one hour (making two hours in all) carrying 100 marks. *

The test, then, was a mass test lasting two hours. The first hour was a speed test, i.e., more items were given than could be done in the time allotted. The tests were divided into sections each of one minute duration, and rotated in sequence. At the end of each minute it was compulsory to turn the page for the next section. The method of marking the test was to subtract the number of wrong answers from the number of right answers, ignoring the number of answers which were left unattempted. The highest possible score was 400, the lowest possible score was -400.

The students were divided into nine classes in order of merit, named: *A, B, C, D, E, F, G, H, I*. The highest class, *A*, includes all those with marks from 330 to 290, *B* had 290 to 250, and so on, with a drop of 40 for each class. For the purpose of averaging, the middle score of each class was taken as a measure of the class. Thus the middle score of class *A* is 310, of *B* 270, and so on.

Table I shows the number of students of each faculty who were found in the respective groups.

If the above results are plotted as curves they show a constant asymmetry. There is a long "tail" of weak students. Taking *C* as the "mode" (the score most frequently gained), all scores of *F* and under compose the tail.

A number of foreigners come to University College and, apparently, they provide more than their due proportion of the "tail." It may be that their poorer conversance with the English language has hindered expression of their ability as measured by the test. It is not possible from the data available in these years to obtain precise information on this point, for "foreigner" from the point of view of the test refers not to nationality but to native language. Accordingly, in the test given in October, 1927,

* It is expected that a full description of the test will be published by the Department of Psychology, University College.

TABLE I.

The following table gives the result of the "General Intelligence Test" for the five years 1922-1926 inclusive.

Faculty.	*Class of "General Intelligence" Test.*									*Total number of students in each Faculty.*	*Average Marks.*	*Rank of Faculty.*
	A.	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*			
Middle Score of Class..	310	270	230	190	150	110	70	30	—10			
Arts { No. of students..	25	180	236	127	52	12	3	5	1	641	225	1
Arts { Per cent of total Arts students ..	*4*	*28*	*37*	*20*	*8*	*1·5*	*·5*	*·85*	*·15*	—	—	—
Science	19	104	171	121	58	12	9	5	—	499	214	2
Per cent	*4*	*21*	*34*	*24*	*11·5*	*2·5*	*2*	*1*	—	—	—	—
Medical Science ..	10	32	42	34	22	22	3	5	2	172	197·4	3
Per cent	*6*	*18·5*	*24·5*	*20*	*13*	*13*	*1·5*	*2·5*	*1*	—	—	—
Librarianship	—	15	36	27	20	6	6	4	—	114	190	4½
Per cent	—	*14*	*32·5*	*22*	*17·5*	*5·25*	*5·25*	*3·5*	—	—	—	—
Laws	3	10	11	9	9	8	2	1	1	54	190	4½
Per cent	*5·5*	*18·5*	*20·4*	*16·7*	*16·7*	*14·8*	*3·7*	*1·85*	*1·85*	—	—	—
Engineering	7	18	28	35	20	14	6	6	2	136	185·9	6
Per cent	*5*	*13·5*	*20*	*26*	*15*	*10*	*4·5*	*4·5*	*1·5*	—	—	—
Journalism	1	—	10	7	2	3	1	1	1	26	180	7
Per cent	*3·8*	—	*38·5*	*27*	*7·7*	*11·6*	*3·8*	*3·8*	*3·8*	—	—	—
Architecture	—	6	15	12	6	6	5	5	2	57	164·7	8
Per cent	—	*10·6*	*26·3*	*21·1*	*10·5*	*10·5*	*8·8*	*8·8*	*3·5*	—	—	—
Fine Arts	1	11	21	31	30	17	14	14	2	141	154·2	9
Per cent	*·7*	*8*	*15*	*22*	*21*	*12*	*10*	*10*	*1·4*	—	—	—
Entire Total	66	376	570	403	219	100	49	46	11	1,840	204·4	—
Per cent.	*3*	*20·5*	*31·1*	*22*	*12*	*5·5*	*2·7*	*2·5*	*·6*	—	—	—

students were asked to write on their papers the name of their native language. The results show the following percentage of students whose native language was some other than English :

In the top five classes (*A*—*E*) :

$$\frac{\text{"Foreign"}}{\text{Total}}\ \frac{12}{385} = 3{\cdot}1 \text{ per cent.}$$

In the tail (*F*—*I*) :

$$\frac{\text{"Foreign"}}{\text{Total}}\ \frac{21}{62} = 33{\cdot}9 \text{ per cent.}$$

We can fairly assume that roughly one-third of the tail are unable to do justice to their ability in the test because they were insufficiently practised in the English language.

Have men or women more "general intelligence" ?

Data concerning sex differences are only available for the following two years. The average score has been worked out from the middle scores of the classes :

1926.	1927.
186 men, average score, 209	237 men, average score, 156·6
131 women, average score, 222	210 women, average score, 159·4
317 total, average score, 214	447 total, average score, 158

The women are therefore slightly superior to men ; but such small difference as does exist is probably due to the fact that those whose native language is other than English are mostly men.

II.—Comparison of the "General Intelligence Test" (1922-1926) with the Ensuing University Examination (1923-1927).

The examinations with which the results were compared were in most cases the Intermediate examinations of the University of London, in a few cases the College Sessional. No strict correlation of the "General Intelligence Test" and the complete results of the Intermediate examination is attempted here. The principal aim is to discover only the grossly discrepant cases at the top and at the bottom of the test and to investigate each such discrepant case individually.

Only the four Faculties, Arts, Science, Medical Science, and Engineering, are taken into account in the following results, because there were too few cases in the other Faculties to have any statistical significance. The

following are the percentages of these students who took the test and failed in the ensuing examination :

Arts, 22·5 per cent ; Science, 13·5 per cent ; Medical Science, 14 per cent ; Engineering, 15 per cent.

The following table shows the distribution of these failures among the nine classes of the test :

PERCENTAGE OF FAILURES IN EXAMINATIONS FOR EACH "INTELLIGENCE" GROUP.

Groups ..	*A.*	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total.*
Total ..	61	333	478	314	151	61	24	19	4	1,445
Failed ..	6	34	76	59	41	8	5	6	2	237
Per Cent. ..	10	10	16	19	27	13	21	32	50	16
						19 per cent.				

It must not, however, be inferred from the figure 19 per cent that roughly 80 per cent of the tail (*F*, *G*, *H*, *I*, taken as one class) are satisfactory. For many of the tail do not reach the examination ; they leave the College, postpone sitting for another year, or are in other ways unsatisfactory. Therefore, it is necessary to add to those who fail those also for whom there is no record of their sitting for an examination :

TOTALS OF THOSE NOT RECORDED AS SITTING FOR ANY EXAMINATION.

Groups ..	*A.*	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total.*
Total ..	4	28	41	23	20	22	8	4	1	151
Per cent. ..	7	8	9	7	13	32				10

TOTALS OF THOSE WHO FAILED ADDED TO THOSE NOT RECORDED.

Groups ..	*A.*	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total.*
Total ..	10	62	117	82	61	30	13	10	3	388
Per cent. ..	17	18	25	26	40	51				26

There have now been introduced misleading figures at the other end of the series. Many *A's*, *B's*, and *C's* are not recorded, not because they are failures, but because they are successes; some have already passed the Intermediate examination; some others also are absent, for example, studying at the Sorbonne. Therefore, by omitting the misleading latter part of the "failed" table and the misleading first part of the "failed and not recorded" table, and by striking an average of the middle classes, we obtain the following figures, which may be taken as a rough comparison of the results of the "General Intelligence Test" with failure at the ensuing examination in June.

CORRECTED FIGURES FOR FAILURES IN RESPECTIVE INTELLIGENCE GROUPS.

Groups	*A.*	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total.*
Failed, per cent.	10	10	16	19	—	—				16 per cent.
"Failed and not recorded" per cent. ..	—	—	25	26	40	51				10 per cent.
Corrected Failures, per cent.	10	10	20	22.5	40	51				16-26 per cent.

A special investigation into the after career of ninety-seven students placed in the tail of the "General Intelligence Test" resulted as follows: thirty-five passed their next examination, twenty-one failed, and there is no record of forty-one. We may safely infer that something over a half but under two-thirds of those students in the tail of the test do not pass the ensuing examination.

To correspond roughly with those who fail at the examination, it is necessary to formulate some definition of "academic distinction." The following three criteria of "academic distinction" have the merit of being easy to apply in practice and of giving roughly the same percentage of the total from the top as those who fail give from the bottom, viz., between 15 per cent and 20 per cent.

(*a*) Prizewinners; (*b*) three firsts; (*c*) at least one first and no thirds.

Of those who took the test the following percentages of the Faculties obtain "academic distinction" in the ensuing examination (London Internal Intermediate).

Arts	14·7 per cent gain distinction.
Science	26·0 per cent gain distinction.
Medical Science ..	12·2 per cent gain distinction.
Engineering	34·4 per cent gain distinction.

It appears that it is easier to obtain distinction in Engineering than in the other faculties. Either the criterion is not suitable for Engineering or the standard of examinations is lower.

PERCENTAGE OF " DISTINGUISHED " IN EXAMINATIONS FOR EACH INTELLIGENCE GROUP.

Groups.	*A.*	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total*
Total (1922-1926)	61	333	478	314	151	61	24	19	4	1,445
Distinguished ..	24	88	79	48	18	1	2	1	—	261
Per cent. ..	39	26	17	15	12	4				18

Some judgment of the prognostic value of this " General Intelligence " Test can be formed by comparing together the two series, " corrected failures " and " distinguished."

	A.	*B.*	*C.*	*D.*	*E.*	*F.*	*G.*	*H.*	*I.*	*Total.*
Failed (per cent) ..	10	10	20	22·5	40	51				16-26
Distinguished (per cent)..	39	26	17	15	12	4				18

We can also deduce the following information :

Of every 100 students entering the College and taking the test after one session, 18 per cent are " distinguished," 56 per cent " pass," 16 per cent " fail," and there is " no record " of 10 per cent. (If we were to distribute the 10 per cent of " no record " the figures approximate to 20 per cent " distinguished," 60 per cent " pass," 20 per cent " fail." This is a justification for our threefold criterion of " distinguished.")

One of the uses of the " General Intelligence " Test is the forwarding of the names of those who do well, say, those who score *A* and *B* to their respective faculties. Generally the best students tend to find the work easier than the average student and tend *not* to extend themselves as they might if they were specially encouraged. We have discovered the case of one student who did well in the test (a high *B*), but, not being known to be potentially brilliant, was so discouraged by his lack of progress that he withdrew after one term.

III.—The discrepant cases.

The discrepancies between the results of the test and of the examination fall into two classes :

(1) Those who do well in the test but are referred or rejected, viz., the "discrepant failures."

(2) Those who do badly in the test but obtain academic distinction, viz., the "discrepant distinguished," as the following table indicates :

	A.	*B.*	*C.*	*D.*	*E.*	*Tail.*	*Total.*
Failures (per cent) . .	*10*	*10*	*16*	19	27	19	16
Distinguished (per cent) . .	39	26	17	*15*	*12*	*4*	18

The discrepancies are taken either side of the total average (204, between *C* and *D*). On the one side the "discrepant failures" are the 10 per cent of *A*, the 10 per cent of *B*, and the 16 per cent of *C* who are referred or rejected. On the other side, the "discrepant distinguished" are the 4 per cent of *F* or under, the 12 per cent of *E* and the 15 per cent of *D* who obtain academic distinction.

The actual discrepant cases were taken from all the Faculties, not only from the four on which the figures in Part II, as above, are based. Owing to the small numbers in the other Faculties, the above table of per cent discrepancies may be taken as a fair approximation to the whole.

Except in Engineering and Architecture the numbers of "discrepant failures" are greater than the numbers of "discrepant distinguished." This difference may be due to the fact that specific abilities in engineering are a greater factor than in other Faculties, and it would therefore be easier for them to do badly in a general test and yet do well in Engineering examinations.

The enquiry aims at answering the following questions :

(*a*) What has hindered the discrepant failures from passing the examination ?

(*b*) What had hindered the discrepant distinguished from doing well in the tests ?

Arrangements were made to interview each student separately, in order to find out what special causes in each individual case might account

for the discrepancies. The response was not complete. The following table gives the proportion of students who actually came for an interview :

	Discrepant Failures.	*Discrepant Distinguished.*	*Total.*
Total (1922-1926)	108	54	162
Responded for interview ..	53	30	83
Per cent	49	55·5	51·2

So, about half the discrepant cases came to be interviewed.

The following is an analysis of the "discrepant failures" and "discrepant distinguished" who came for an interview, according to their Faculties :

	Arts.	*Libr.*	*Journ.*	*Law.*	*Sci.*	*Med. Sci.*	*Eng.*	*Arch.*	*Total.*
Discrepant Failures, actual cases responding for interview	25	3	1	1	11	8	2	2	53
Per cent ..	47·1	5·7	1·9	1·9	20·8	15	3·8	3·8	100
	56·6				35·8		7·6		

	Fine Arts.	*Arts.*	*Libr.*	*Sci.*	*Med. Sci.*	*Eng.*	*Arch.*	*Total.*
Discrepant Distinguished, actual cases	1	6	2	10	1	7	3	30
Per cent.	3·3	20	6·7	33·4	3·3	23·3	10	100
	3·3	26·7		36·7		33·3		

IV.—THE QUESTIONNAIRES.

Two questionnaires had already been prepared by Professor Spearman (1) "Methods of Work," and (2) "General."

(1) "Methods of Work" had already been given to some forty chance students taken at random, the results of which where possible are included below. Both questionnaires were revised, given to

the 1922 "discrepancies" and revised again. The revision chiefly took the form of framing the questions so that the answers must be unequivocal, standardized, and directly quantitative, or, at least, easily amenable to quantitative treatment, and could be answered shortly on a small form. Space was left for the students' own words where further explanation was required. In every case an interview followed the answering of the questionnaire. The object of the interview was to ensure that the information contained in the questionnaire should be as accurate as possible and also to reveal any further points relevant to the enquiry. The questionnaires took about half an hour on the average to complete and the interviews about a quarter of an hour, but there was considerable variation from one student to another.

The answers to the questionnaires do not contain results that have been objectively measured. They contain the estimations of the students themselves. A belief about one's behaviour does not necessarily coincide with that behaviour as objectively observed. The writer does not regard the use of questionnaires to obtain data of this kind as anything more than a rough survey of the field preparatory to properly controlled objective measurement.

THE QUESTIONNAIRE AND ITS RESULTS.

I.—*On Methods of Work.*

N.B.—dF=discrepant failures.
dD=discrepant distinguished.

(1) Let 100 represent the total time you give to lectures and practical work. What percentage is employed in :

(*a*) Attending lectures and practical work ?

(*b*) Revising notes of lectures and practical work ?

Result of question (*b*) :

53 cases dF, average 39·6 per cent.

30 cases dD, average 36·3 per cent.

There is obviously here no significant difference. If anything, the result contradicts what we should expect, viz., more revision from the discrepant distinguished.

Possibly the more successful students learn more easily and so have less need to spend time on revision.

(2) Let 100 represent the total time you give to reading and private study. What percentage is devoted to

(*a*) Fresh reading ?

(*b*) Simple repetition of reading ?

(*c*) Reflecting over what you have read ?

(*d*) Writing analyses, abstracts, cross references, etc.?

	a.	*a*+*b.*	*b.*	*c.*	*c*+*d.*	*d.*	*Total.*
50 cases *dF*, per cent ..	43	65	22	15	35	20	100
29 cases *dD*, per cent ..	42	61	19	18	39	21	100
40 cases chance, per cent ..	43	64	21	22	36	14	100

These results show a greater proportion of time spent on reflection and analyses (*c*+*d*) among the discrepant distinguished than among the discrepant failures. But as engineers probably do less reading than students in the other Faculties, these results cannot be held significant as between the discrepant distinguished and the discrepant failures. [See the last table in Part III, engineers are 23·3 per cent of *dD*, but only 3·8 per cent of *dF*; therefore Engineering students are relatively much more heavily weighted among the discrepant distinguished.]

(3) Let 100 represent the total time you spend on work:

(*a*) What per cent is devoted to a regular programme?

(*b*) What per cent is freely varied according to circumstances?

Result:

53 cases *dF*, average 49 per cent.
30 cases *dD*, average 57 per cent.

Working to a regular programme seems, therefore, more conducive to academic success.

(4) How many hours in an average week do you spend on:

(*a*) Academic courses?

(*b*) Private study?

Results:

	a.	*b.*	*a*+*b.*
			Total hours per week.
26 cases *dF*, average	18	20	38
Per cent	47	53	—
28 cases *dD*, average	27	19	46
Per cent	59	41	—

This indicates that *dD* do 50 per cent more hours of work in college than *dF* and do very slightly less private study. Moreover, *dD* put in eight hours per week more working time than *dF*. But, considering the high percentage of Engineering students among *dD* who do more practical work, this is only what we might expect.

Grouping all the Faculties together obscures the real relation between *dF* and *dD*. The figures are small but the following analysis of the results into Faculties gives a better indication of the significance of the figures.

Faculty.	*Number of Cases.*	*dF.*		*Number of Cases.*	*dD.*		*Total hours per week.*		
		a.	*b.*		*a.*	*b.*	*dF.*	*dD.*	*dF.<dD.*
Arts	13	14	26	8	17	31	40	48	8
Per cent ..	—	35	65	—	35	65	—	—	—
Science ..	7	23	15	9	26	16	38	42	4
Per cent ..	—	60	40	—	62	38	—	—	—
Engineering ..	—	—	—	7	36	14	—	40	—
Per cent ..	—	—	—	—	72	28	—	—	—
Architecture ..	—	—	—	3	32	9	—	41	—
Per cent ..	—	—	—	—	78	22	—	—	—

Students of Science, Engineering, and Architecture, no doubt owing to their laboratory work, spend a greater proportion of their working time in College. Allowing for the differences between the Faculties, there is practically no difference between *dF* and *dD* in regard to (*a*) and (*b*). But note that only twenty-six out of fifty-three *dF* are willing to answer this question.

In arts and science it is quite clear that the " distinguished " spend more hours per week working than the " failures." But owing to the small number of cases the exact figures cannot be regarded as reliable.

(5) In answering the following questions (5, 6, and 7), write :

S for same Time.
D for same Day.
W for Week-end.
M for during Month.
T for end of Term.
V for during Vacation.
E for just before Examination.
N for never.

(Some answers were given as Variable = *v*).

How soon after taking notes do you make your first revision of them ?

No. of Cases.	*SD*	*W.*	*Total.*	*M.*	*Total.*	*T.*	*Total.*	*V.*	*E.*	*N.*	*v.*	*Total.*
53 *dF*, per cent	8	22	30	15	45	8	53	4	26	4	13	=100
29 *dD*, per cent	21	10	31	17	48	14	62	—	17	4	17	=100
40 chance, per cent.. ..	36	12.5	48.5	2.5	51	19	70	2.5	22.5	5	—	=100

In general, the first revision of notes is not done by a fifth of the students until just before the examination. It is significant that *dF* tend not to revise their notes on the same day, whereas *dD* and the chance selection tend to do so ; *dF* revise their notes neither so quickly nor so consistently as *dD* and the "chance" students.

(6) How soon after reading do you make any analyses, abstracts, or cross-references ?

No. of Cases.	*SD.*	*W.*	*Total.*	*M.*	*Total.*	*T.*	*Total.*	*V.*	*E.*	*Total.*	*N.*	*v.*	*Total.*
53 *dF*, per cent	55	6	61	9	70	6	76	—	11	87	7	6	= 100
28 *dD*, per cent	58	11	69	11	80	—	80	—	11	91	3	6	= 100
38 chance, per cent	69	2·5	71·5	2·5	74	4	73	2·5	10·5	91	4	5	= 100

There appears to be no significant difference in these figures.

(7) How soon after reading or writing anything do you simply re-read it ?

No. of Cases.	*SD.*	*W.*	*Total.*	*M.*	*Total.*	*T.*	*Total.*	*V.*	*E.*	*N.*	*v.*	*Total.*
53 *dF*, per cent ..	33	7	40	7	47	5	52	7	18	6	17	100
30 *dD*, per cent ..	35	8	43	10	53	5	58	4	15	13	10	100
40 chance, per cent	29	1	30	16	46	4	50	2.5	12.5	10	25	100

There is little difference in these figures. Note, however, that 13 per cent *dD* never do simply re-read, possibly because they have no need to do so, but more probably because there is less reading to be done in Engineering.

(8) Let 100 represent a lecture written out in full, then of what percentage of fullness are your notes?

No. of Cases.		*Average.*	*Lowest.*	*Highest.*
53 *dF* ..	2 give no answer, 3 answer "variable," and 46 cases *average*	*per cent.* 47	*per cent.* 5	*per cent.* 98
30 *dD* ..	1 " variable," and 29 cases *average* ..	64	10	95
43 chance ..		51	10	90

The question given to the "chance" students reads as follows: "Are your notes usually full or brief?" The quantitative result above is roughly computed by translating verbal answers into percentages on the scale:

90 = "Almost verbatim."
80 = "Very full."
70 = "Full."
50 = "Full as regards information but condensed in form."
25 = "Brief."
10 = "Very brief."

There is, therefore, a marked tendency for *dD* to take fuller notes. The answer to this question must vary to some extent with the different methods of the lecturers, some of whom expect verbatim notes to be taken by their students.

(9) Which of the following methods do you use most?

(*a*) Mastering each small section (such as a chapter) as you go.
(*b*) Pushing on as best you can to the end of the book, and then mastering the smaller sections in the light of the whole.
(*c*) Continuing to push on until near the examination, and then clearing up any difficulties that still remain.

	(*a*)	(*b*)	(*c*)	
53 cases *dF*, per cent	43	34	23	= 100
30 cases *dD*, per cent	50	27	23	= 100
41 cases chance, per cent ..	58·5	19·5	22	= 100

Method (*b*) is generally considered the better method, both on *a priori* grounds and as a deduction from experiments showing the advantages of the method of learning by "wholes." Nevertheless, it would appear from these results that the more successful students tend to employ this method less frequently than the less successful students.

Some answers indicate variation according to the subject studied. For example: "It depends upon the subject. If I consider it easy, I do not trouble about it until a few days before the examination." "Usually (*a*), sometimes (*b*) in cases of especial difficulty." "It depends on the books." "In philology I use methods (*a*) and (*b*) in about equal proportions, in literature I generally use method (*c*)."

(10) Write *B* if you usually read up the subject *before* you attend a lecture or practical work; *A* if after; *BA* if you read up the subject both before and after.

	B.	*BA.*	*A.*
52 cases *dF*, per cent ..	8	8	84
28 cases *dD*, per cent ..	7	7	86

There is no significant difference, although *a priori* we should expect the distinguished to use *B* and *BA* more frequently than *A*.

There is a tendency for the answers to this question to vary with the subjects studied, e.g.:

"Read up before practical work; after lectures."

"Language and preparation of texts before the lecture, reading connected with general literature after the lecture."

"Read up before for general impression, after for particular points."

"In philology—immediately before the lecture."

"In literature after the lecture."

(11) Let 100 represent the total work you do in the last week before an examination. How do you divide it into:

(*a*) Reading books.

(*b*) Reading your notes from books.

(*c*) Reading your notes from lectures and practical work.

Here *dD's* small score under (*a*) and a large score under (*c*) is due to the practical nature of the work of engineering students. This obscures anything else that may be significant in the figures.

(12) How do you pass the last week before an examination, in per cent increase or decrease of the following activities?

Work, Games, Sleep, Eating, Holiday.

Example: Usual Work = 100; Double Work = 200; Half Work = 50.

	Work.	*Games.*	*Sleep.*	*Eating.*	*Holiday.*
53 cases *dF*, average	183	71	102	95	71
30 cases *dD*, average	158	81	101	98	70

These figures show that the "discrepant failures" increase their work before an examination more than do the "discrepant distinguished." From question 4, however, we learn that *dF* average 38 hours per week and *dD* average 46 hours per week. Therefore we can deduce that before an examination *dF* average 70 hours per week and *dD* 73 hours per week. So that in absolute amount of work *dD* still exceed *dF*. We should, however, remember that results are obtained from averages of students' estimates, not from averages of hours that have been objectively measured.

In a further short paper including an account of the "general" questionnaire we shall consider some causes why students who did well in the test subsequently failed in their "academic" work and a general survey of results will be given.

From the results of this questionnaire it appears that it will be essential in future work to treat all Faculties separately, for their varying methods necessitated by the subjects studied make comparisons extremely difficult.

RÉSUMÉ.

Cette étude fournit un compte-rendu de tests appliqués à 1,800 étudiants d'Université, tirés des facultés des Lettres, des Sciences, de la Médecine, et d'autres *cours. Les résultats démontrent chez les étudiants des facultés, qui contenaient le* plus grand nombre, l'ordre suivant d'intelligence générale: d'abord les Lettres, ensuite les Sciences, la Médecine, les Bibliothécaires, les Ingénieurs et enfin les Beaux-Arts. On compara ces résultats un an plus tard avec les résultats des examens universitaires et il se montra un degré élevé de correspondance. Les cas exceptionnels (i.e., ceux des étudiants réussissant bien les tests et mal les examens et réciproquement) furent étudiés au moyen d'un questionnaire et individuellement quant aux méthodes de travail, au temps consacré à la revision, au partage du temps entre les conférences et la lecture, etc.

ÜBERSICHT.

Diese Abhandlung berichtet über Intelligenzprüfungen bei 1,800 Universitätsstudenten in der philosophischen Fakultät, der naturwissenschaftlichen, der medizinischen, und anderen. Aus den Resultaten ging hervor, dass die Ordnung der Durchschnittsintelligenz von den Studenten der grösseren Fakultäten folgende war, erstens, Philosophie, dann Naturwissenschaft, Medizin, die bibliothekarische Fakultät, und letztens, die Schönen Künste. Man verglich die Ergebnisse der Intelligenzprüfung mit denen der Universitätsprüfung ein Jahr später und bemerkte dabei einen hohen Grad der Übereinstimmung. Unvereinbare Fälle (d.h. wo Studenten bei Intelligenzprüfungen Gutes und bei Universitätsexamen Schlechtes leisteten oder umgekehrt) wurden durch Fragebogen und individuell mit Bezug auf Methoden der Arbeit, Dauer von der Revision der Arbeit, Verhältnis der Vorlesungen und der Lektüre u.s.w. beobachtet.

THE BASIS OF MARKING.

By FRANK SANDON.

I.—*The value of an answer.*

(*a*) *Assumptions in current practice.*
(*b*) *Some theoretical considerations.*
(*c*) *Actual methods in modern examinations.*
(*d*) *The Terry Thomas Ideal Mark Scale.*

II.—*Four mark schedules applied to a trade scholarship examination, and their effect on the awards.*

III.—*Relative merit of atoms forming correct answers.*

IV.—*Four mark schedules applied to an intelligence test in a secondary school free place examination.*

V.—*Summary of results and conclusions.*

I.—The value of an answer.

One of the perennial questions that worry teachers and examiners is that of the proper basis of marking. Assuming that we feel satisfied that we are dealing with a subject and its answers where a fairly objective standard of marking is possible, that the whole value can be regarded as the sum of separate values and that these can be resolved into their atoms of information, fact, habit, skill, method, etc., we have still to decide :

(1) What is the appropriate relative value to be assigned to each conglomeration of information, etc., commonly designated as an "answer to the question"?

(2) What is the appropriate relative value to be assigned to each atom of information, etc., that goes to make the conglomeration?

(*a*) *Assumptions in Current Practice.*

To these two questions, which are really but two aspects of the same problem, various replies are given :

(1) The anti-numerical school works on pure impressionism and assesses scripts, answers, and parts on what is largely a subjective method.

(2) The ordinary teacher evolves from his inner consciousness the idea that this question is worth, say, 5, this one 15, and so on. In this, the notion at the back of his head is apparently that certain questions are harder than others and that a good answer deserves more in the harder case than in the other.

(3) An extension of this idea is what we may call the head master's theory, which is that the relative importance of various items is determined by the time taken to do them well; a subject that needs six periods a week is three times as important as one that needs two per week, and a question that takes twelve minutes to answer well by any candidate deserves four times as many marks as one that takes him three minutes. This egalitarian view of experiential time units is, however, as fallacious here as elsewhere; oral or practical examinations may take far more time than other types and be of less validity in measuring the function required than other types of examination.

(*b*) *Some Theoretical Considerations.*

If we leave the realm of imagination for that of fact, we find practically no work has been done on the question. One method (4) that the writer feels offers some promise is to use the analogy of the agriculturist's yield trial statistical methods, treating the soil as analogous to the candidates' all-round ability in the subject, the seed, etc., variety as analogous to the particular question asked, and the all-round richness of the soil as the required total mark. For the present it has not been possible to pursue this treatment. Another (5) is that of a multiple regression equation based on Spearman's g. Assume that for an intelligence test we can find the correlation of each section with g. From this we can, knowing the inter-correlations, find an equation for g in terms of scores on various tests. Extending this idea, the term order or examination rank is determined by discovering a mark obtained from scores in separate subjects scaled to various s. ds. and added—this last is, of course, the simplest way of computing the application of the multiple regression equation. This method involves, however, a knowledge of g or of its equivalent on the assumption that running through all the scores is a common and general factor, which factor we wish to measure. It may be, however, that this is not quite what we need; we may not want the common and

general examination factor of some sort of combination of intelligence with neatness of script and accuracy in reading questions, etc., but simply the first of these. The main objection, however, to this procedure, is the very heavy computation involved. This would be even heavier than appears from the above, for really each unit atom should be combined with the others according to the method, and every subject, nay, every question, can only be assessed by computation of the regression equation. Alternatively, we can try Kelley's Method (*Cross Roads in the Mind of Man*) which involves again very heavy computations.

In examining the question yet another analogy presents itself. It is common knowledge that the statistician has to use for various purposes index numbers. The most familiar is, perhaps, the Ministry of Labour Retail Prices Index Number. Various commodities of varying importance in the expenditure of working-class families fluctuate in price from time to time and the Index Number is an attempt to indicate how the cost of supplying the same commodities changes. It is based on a computation involving the addition of products of "weights" and "article percentage fluctuations." Other Index Numbers are in existence for other purposes, and Professor Irving Fisher, among others, has devoted a large volume to a discussion of the best index number for various purposes. It appears that the total score that the examiner needs might be analogous to the index number, in which case the computation of it might quite well depend on the purpose that it has to serve, just as a wholesale prices index number serving a different and special purpose is calculated very differently from a retail prices one. This brings us to the problem that every examiner has to face right at the beginning: what is the function of the examination? It is important here to clear the ground of one fallacy that still crops up, although it has often been pointed out (*vide*, e.g., Wallis: *Technique of Examining Children*, p. 30; Crofts and Caradog Jones: *Secondary School Examination Statistics*, pp. 44-45). No examination gives an absolute scale*; until we have actually tried out our questions and the schedule of marking we cannot say if 50 per cent on one paper is equivalent to 50 per cent on another. It is impossible to guarantee that two papers should be exactly of the same standard. As a corollary it follows that there is no fundamental distinction between a qualifying and a competitive examination; the standard of any examination can be determined only by a study of mark distribution. In consequence, it is not the function of any examiner to say if a candidate has passed or not; it is simply his function to string

* See also my paper on: *The Fallacy of Percentages, Forum of Education*, November, 1926.

out the candidates in order of merit. And it is this, whether he is dealing with an examination where the top 1 per cent, the top 10 per cent, or the top 99 per cent are required.

(c) *Actual Methods in Modern Examinations.*

It seems of interest, therefore, to see how far this is affected by modern examinations. Other than the Civil Service Examinations, the big examinations in the country are those held by the eight authorities recognized by the Secondary Schools Examination Council and by the L.E.A.'s for Free Places, etc. In both these types of examination one or more of certain schemes are being adopted to increase the simplicity of marking. Such are the following :

(1) If right, give full marks ; for any error give zero, whatever the nature of the error.

(2) If method right, give half marks straight away whatever the working. Any indication that the candidate knows the method is sufficient.

(3) In Modern Languages, give credit for bits done, not deductions for errors made.

(4) Deduct two for first error, four more for next, give zero for more than two errors.

(d) *The Terry Thomas Ideal Mark Scale.*

The writer thought it worth while making some investigation into the problems indicated by the foregoing practical and general considerations. When the work was practically completed, Dr. Terry Thomas published his *Science of Marking*, and in it refers in the Appendix to what he calls "The Ideal Mark Scale." His treatment brings to a head certain points that seemed to need clearing up so that the work was recast to emphasize some of the fallacies of this book.

This book contains some other fallacies to which attention should be drawn before we pass to our main criticisms.

(1) The scatter diagram for correlations was noticed by Galton to have regular contours and it is fundamental to the idea that for two correlated and normally distributed functions these contours should approximate to similar and similarly situated ellipses. A straight line frequency such as Dr. Thomas says on p. 41 is obtained gives unit correlation.

(2) In connection with fourfold tables Pearson will not probably admit that any method is a satisfactory alternative to the use of tetrachorics. The formula of p. 61 was suggested by Pearson as better than some proposed by other workers, but it was not recommended by him. Actually the tabulation given by Dr. Thomas is a special case where the dichotomy is at the median and Sheppard's Formula for " r " is appropriate.

(3) With reference to age allowances the argument of pp. 107-109 does not seem to be valid. Dr. Thomas computes an age allowance for the *average* of boys of age groups and then without further investigation applies it to the *top* boy of each group. This is only legitimate if the arrays are similar and homoscedastic (see *Some Effects of Age in Selective Examinations*: *Forum of Education*, Nov., 1928, pp. 276-278).

II.—Four mark schedules applied to a trade scholarship examination.

The enquiry was based on the analysis of parts of two examinations. In the first place, we considered a Trade Scholarship Examination paper consisting of seven questions; this was taken by 253 girls and marked in strict accordance with a detailed schedule referred to on page 302 as Schedule α. The first three questions were related and we may group them together for our consideration here. We shall assume that the object of the examination was to allocate the best 20 per cent of the candidates to suitable free places. The examiners' marks led to a frequency distribution given in Table I (α). This shows a distribution slightly skewed (the total frequency is too small to make worth computing the actual constants) as was presumably desired by the examiner, for the schedule spreads the borderline somewhat, 43 candidates having 41 or more marks, and 19 more between and including 37 and 40 marks.

The marks were carded and the candidates reassessed on Terry Thomas lines. For this we need the mark frequency distribution of each question as first marked. This was obtained in detail; a summary of the results appears in the first five rows of Table II. On referring to Thomas' book we find that we have first to give a precise meaning to his phrases "number who fail to solve a problem," "problem is solved by 30 per cent," " the percentage doing the question." These expressions will not give the same interpretation except in the case of simple right or wrong questions referred to above as units. None of the questions of this paper are of this nature, and we may have different Thomas

percentages. Thus for Qu. 6 47 candidates made no attempt, 64 scored 0, 17 scored 8, 17 scored 14, and 107 scored 15. How many "do the question?" Is it 107 or 124? How many "fail to do the question?" Is it 47, 111, or, say, 253 – 107, i.e., 146? Did the people who scored 8 "do the question," "solve the problem," or "fail to solve the problem?" The phrases are too vague. We have, therefore, taken an arbitrary interpretation and have obtained from it the Schedule β of Table II., approximating to the Thomas Schedule by the rough rule given in the Table for obtaining the marks from α. This leads to a frequency distribution given also in Table I. We notice, in this connection, several things. The Thomas marks are obtained from his ogive curve given on his p. 121, this giving the accumulated frequency of the normal curve between $x = -2{\cdot}5\,\sigma$ and $x = +2{\cdot}5\,\sigma$. There is no valid reason why the marks should be spread over this particular range. A much wider range such as $x = -10\,\sigma$ to $x = +10\,\sigma$ is equally justified. This would give a curve much more steplike in nature. Any intermediate type may be obtained by a suitable range; the curves would agree only in making the curve at 0 and 100 percentiles roughly parallel to the mark axis. Any of these schemes will at once alter the marks so that the Thomas table and graph has no sound basis even were his other fundamental assumptions sound. We submit, however, that even in this he is not justified. The assumption now in question is that the mark value should vary with the hardness of the question. Is this so? Suppose a candidate fails on a very simple question. Shall we say "That question is easy and not worth much when compared with the next, a hard question?" Might we not say "This fellow must be a fearful fool if he can't do this, and deserves to be penalized heavily?" What good, however, is it to our problem of stringing out the candidates if a question that no candidate can do scores 10 and a question that everyone can do scores 0? The important thing is that the candidates should be separated and distinguished in final rank by the questions which some can do and some cannot. This suggests that perhaps the best method would be to give the highest marks for those questions just done by 50 per cent of the candidates, as these questions are the real discriminating ones. Taking three points, 0 for questions 0 per cent do, 10 for those 50 per cent do, and 0 for 100 per cent do, on the mark-percentile plane we can adopt any law of monotone intermediate values. An arbitrary inverted U (roughly a normal curve, say) will serve as a guide. This gives us Schedule γ of Table II with the corresponding frequency of Table I. If we examine this frequency we note that we have a packed borderline—36 cases at marks 14 and 15. It is true that the maximum

has been reduced. But on plotting the ogive curve for rank and mark we note that instead of having, as we require, a big range of marks at rank 20 per cent down, necessary to discriminate at the borderline, a feature that would be evidenced by a flat and more nearly horizontal portion of the curve, we have a steep portion. The reason, it is submitted, is that it is fallacious to give the maximum mark to the question done by 50 per cent of the candidates. By taking a frequency distribution as mark basis with maximum at the median we have the median candidates well spread. The total mark frequency curve is, in fact, largely rectangular in shape rather than highly peaked. If we need the best 20 per cent we want to distinguish these from the rest; the scholarship people and the runners up will practically all do a question that 60 per cent or 80 per cent of the whole field solves. But a question that only 20 per cent do is very suitable for spreading the borderline at 20 per cent down. An arbitrary inverted U skew curve is taken with a mode at 20 per cent candidates solve. Using this and arranging to get some marks bigger than in α, instead of, as in β and γ, all less, and a consequent packed frequency distribution, we have Schedule δ of Table II giving the frequency of Table I and an ogive curve conveniently flattish at 20 per cent down. This spreads the borderline and it is submitted that it is, therefore, a better schedule than any of the others for the purpose of this examination.

And their effect on the awards.

It is of interest to note how the various schedules award the scholarships. For brevity we shall simply consider the two schedules α and δ. For these we have the following table:

		Schedule α.			
		Award	*Border Line*	*Out*	*Total*
Schedule δ	Award ..	34	10	5	49
,, ,,	Border Line ..	1	1	6	8
,, ,,	Out	8	8	180	196
	Total ..	43	19	191	253

Roughly speaking, the awards are the same; whichever schedule we adopt practically three-quarters of the awards granted by one system are granted on the other and almost four-fifths of the candidates are ruled out either way. The other cases are few in number, but, of course, from the point of view of the individual the decision is important. Let

us look at the eight cases (A to H of Table III) that get an award on Schedule α and not on Schedule δ and the five cases (V to Z) who are out on Schedule α but in on Schedule δ. The width of the actual borderline is arbitrarily determined; we have aimed at about 10 but, with the small numbers of our sample, equality in the width is impossible. In α we take (see Table I) 37 to 40 marks as the borderline, and in δ 42 to 45 marks. The detailed marks of the cases, A to H and V to Z are shown in Table III. Roughly speaking, A to H are favoured by Schedule α rather than Schedule δ because they can do questions 1 to 3 better than questions 5 to 8, V to Z by Schedule δ because they do question 5 better than any of the first mentioned group of candidates. Which group is really the better? Group A, etc., who can do questions 1-3, easy questions where more than half the candidates get half marks on the three combined, but cannot do question 5, a harder one, where less than a third get half marks, or Group V, etc., who can do the harder question that the others cannot do, but not the easy one which they and many others can do? It would be interesting to have some other criterion of the relative worth of these two groups of candidates and of abilities; a Spearman formula might help us on information from this examination alone. But it is submitted that mere impressions will not.

III.—Relative merit of atoms forming correct answer.

A point that does arise, however, is the basis of marking within the question. This is another aspect, as indicated above, of the general idea of the value of a unit atom. A particular aspect is that of the relative deductions or credits for method and for accuracy. They both may be related to the idea of marking for understanding and carrying out instructions and of marking for mechanical drill. In marking a set of matriculation scripts the writer particularly noticed that there was not one of the rubrics that some candidate or other did not fail to observe. If a candidate misreads certain instructions and does not present himself for the examination at the proper time, he is penalized. Should he be penalized, and if so, by how much, for giving, by a slip (the deliberate cases can usually be identified) a correct answer on the natural regions of Australia when the question said South Africa or in an essay paper which asked for a letter to which a reproduced letter was the reply for giving the letter which replies to the reproduced one? If experienced, capable, and responsible teachers are asked about this they give various and contradictory advice. With the object of dealing with this question in the particular aspect of the method of all or nothing marking, etc., a further analysis of another examination was made.

IV.—FOUR MARK SCHEDULES TO A SECONDARY SCHOOL FREE PLACE EXAMINATION.

The 1930 Secondary School Free Place Examination for boys and girls aged 10+ and 11+ in a county borough included a so-called Intelligence Test consisting of the following questions :

Question I : 5 parts, each a case of identifying the non-member of a jumbled numerical series.

Question II : 4 parts, each requiring two synonyms to be picked out from five words.

Question III : 5 parts, each requiring a numerical series to be continued for two terms.

Question IV : 5 parts, each requiring the last word of a jumbled sentence to be identified.

Question V : 4 parts, simple arithmetical problems about ages now and at other times.

Question VI : 4 parts, each requiring the identification of the middle of five jumbled categories.

Question VII : 3 parts as in III.

Question VIII : 3 parts as in IV.

The basis to which the original examiners marked was such as to make the maxima on the "English" and on the "arithmetic" parts approximately the same. This is given as Schedule ε of Table IV with the resulting mark frequency distribution for question for 155 candidates of ages 10„8 and 10„9. These two arrays were chosen for the following reasons :

(1) The labour involved in dealing with all the 2,500 candidates would have been two heavy.

(2) They were fairly homogeneous.

(3) The 11+ group had been "creamed" the previous year as 10+ and eligible for the examination.

(4) The 10„10 and 10„11 groups were not so numerous as the two chosen.

(5) The younger groups similarly were not so numerous.

The frequency distribution of the 155 candidates' total marks is given in Table V. For two of the questions (IV and VI) there are modes of maximum frequency at the maximum mark. Since in each of these the actual working of the question presents little difficulty, once the idea is grasped, they seem peculiarly suitable for marking for idea only by use of the scheme all or nothing. Let us, as before, modify the examiners' schedule. In the first place, we adopt, in place of the ogive curve of Thomas' book, an approximation to it, and a simple form, consisting

in a straight line relation from 0 per cent wrong 0 marks to 100 per cent wrong 10 marks. This is, of course, quite as unjustifiable on any *a priori* grounds as the Thomas method. It gives the "Mark on Linear Basis" of Table IV; the actual scheme adopted (ζ) is roughly approximate to this and obtained from ε (see Table IV). It will be noticed that the maxima for questions VII and VIII do not follow these rules. The reason is that there appeared to be no valid reason for marking the parts of these differently from the parts of III and IV; any difference in the mark distribution found might quite well be due to insufficient time for the later questions. The frequency distribution of total marks is given (Table V). The ogive curve is roughly linear and just as with the Thomas Schedule before (Schedule β) the Schedule does not help much to discriminate at the borderline. So we experiment further. The marks on Schedule ε for about the top 20 per cent of the candidates for each question were found. For instance, 32 had 3 or more in question I, 37 had 6 or more in Question II, etc. It might plausibly be said that the top 20 per cent found 3 marks in Question I as easy to get as 6 in Question II, and that fairness should require the two questions to score equally heavily. The corresponding marks for Question III, V, and VII were similarly 9, 3, and 5. Schedule ζ was thus obtained for these questions. Questions IV, VI, and VIII have respectively 111, 61, and 52 at the maximum possible. The basis of Schedule ζ was therefore modified in these cases. For Question VI since 40 per cent (i.e., about twice 20 per cent) had the maximum, the parts were made to carry half as much as the standard. Questions IV and VIII were grouped together and this leads us up against another difficulty which is common to the Thomas method and all those used so far. It is this. If 111 do Question IV correctly and 52 do Question VIII correctly, the number that do both correctly will certainly be less than 52 and might be much less. Suppose that it is 40. No system that has been suggested above will make the separate "ideal" marks for Question IV and Question VIII add up to give the "ideal" mark for Question IV—combined-with-VIII. We shall take for our η Schedule a modification of ε and give 5, 3, or 0 according as on the two questions combined 7, 6, or less parts are correct. This schedule will give us the frequency distributions of Table V, showing an ogive rather better than before but still with too many on the borderline. So we come to the final suggestion, which is to give maxima per question as in Schedule η but apply a drastic deduction for everything wrong within a question, two mistakes getting 0 straight away. This is Schedule θ. We have at last a good ogive with a well spread borderline; practically the whole range of marks is used on all those in the running

and there is a cluster of those definitely out, at the total mark 0. When we turn to see how this scheme affects the awards we have the remarkable result of the following table :

		Schedule ε.			
		Awards	*Border Line*	*Out*	*Total*
Schedule θ	Awards ..	20	3	2	25
,, ,,	Border Line ..	5	3	4	12
,, ,,	Out	1	4	113	118
	TOTAL ..	26	10	119	155

As before, we have aimed at an award of about 20 per cent with a borderline of 4 per cent on either side ; the range of marks is given in Table V.

We note that there is only 1 of the Schedule ε awards that is definitely out on Schedule θ and only 2 of those of Schedule θ who are out on Schedule ε. The details are given as before (see Table VI). We see that the award, as far as these cases are concerned, practically turns on whether a candidate can do a hard series problem (it will be noted that only sixteen candidates altogether did four or more parts here) or the "middle category" set of questions (where, speaking broadly, if a candidate got the idea he did all the parts, as sixty-one of the candidates did). Once again, on the face of it, there is no clear reason why one type of candidate should be selected rather than another ; no casual inspection can say whether a solution to one problem is so much more creditable than that of another as to outweigh failure in other directions. And again we note that aiming at thirty-one awards and aiming at about five on either side of the dividing line as borderline, almost eighty per cent of the awards granted by one system are granted on the other and almost four-fifths of the candidates are ruled out either way.

SUMMARY OF RESULTS AND CONCLUSIONS.

We thus reach the following conclusions :

(1) There is no theoretical justification for any "ideal" mark based on the relative difficulty of the questions.

(2) Nor for one based on any assumption of normal (Gaussian) distribution.

(3) There is no practical advantage to be obtained from making any such assumption.

(4) The correlations between abilities to do various questions are sufficiently high to make the problem of marking resemble that of finding a prices index number for giving the general trend of fluctuations of correlated prices of divers articles.

(5) Just as in this case the actual "weights" are unimportant (see, e.g., Bowley's *Elements of Statistics*, second edition, p. 113) so here much the same results are obtained,* whatever maxima are carried by the different questions (the actual correlations of the tables on pages 302 and 306 could be computed by tetrachorics if desired).

(6) The important thing in examining is to know the purpose of the examination.

(7) If the purpose of the examination is to choose the best twenty per cent of the candidates the most useful questions are those which can be done by about twenty per cent and not done by about eighty per cent.

(8) In such cases a drastic scheme of deductions for incomplete or imperfect answers is of value in discriminating between the two classes of candidates.

(9) Using such methods the mark distribution may be modified as the examiner wishes; there is no such thing as an absolute standard, nor a preassigned "pass" mark.†

Schedule	α	β	γ	δ	ε	ζ	η	θ
Pass	23	5	3	60	68	38	41	11

(10) The relative merits of two candidates, one of whom does a hard question and not an easy one, and the other the easy one and not the hard one, cannot be decided *a priori* or by impressionistic methods; probably the only safe guide would be to calculate the correlations of their marks with later academic success.

* Cf. the table in "The Scaling and Totalling of School Marks," *Forum of Education*, February, 1924.

† Taking 60 per cent as a pass mark the approximate numbers of candidates passing are as follows: (α to δ out of 253, ε to θ out of 155).

Table I.

Frequency distribution of 253 scripts.

*Total Mark**	0— 0—	5— 2—	10— 4—	15— 6—	20— 8—	25— 10—	30— 12—	35— 14—	40— 16—	45— 18—	50— 20—	55— 22—	60— 24—	65— 26—	*Award.* *Minimum Mark.*	*Award.* *No.*	*Border Line.* *Minimum Mark.*	*Border Line.* *No*
Schedule α	25	21	23	30	33	39	18	16	21	20	1	3	3	—	41	43	37	19
,, β	36	28	39	45	31	27	22	12	6	3	3	1	—	—	12	47	11	11
,, γ	27	17	27	37	27	18	29	36	32	3	—	—	—	—	16	35	14	36
,, δ	43	32	11	26	41	5	8	22	15	9	11	19	9	2	46	49	42	8

*The scales 0, 5, 10, ... apply to Schedules α and δ, and those 0, 2, 4, ... to Schedules β and γ.

Table II.

Question No.	1 to 3	4	5	6	7
Schedule α. Maximum Mark ..	15	14	18	16	14
Frequency of No attempt	0	50	48	47	68
Frequency at 0 (on α)	36	193	105	64	169
Maximum Frequency (α) No. (at) ..	60 (15)	9 (14)	52 (18)	107 (15)	6 (14)
Other Important Frequencies (at) {	33 (15), 30 (8),	—	14 (6)	17 (8)	8 (10)
	35 (10), 37 (13).	—	25 (15).	17 (14)	—
Right or nearly Right (at)	162 (8+)	10 (10+)	83 (14+)	124 (14+)	16 (5+)
These as Percentage of 253	64	4	33	49	6
Percentage of others	36	96	67	51	94
β after Thomas	4	9	6	5	8
β from α	α/4	α/2	α/3	α/4	α/2
γ Maximum	8	2	8	10	2
γ from α	α/2	α/7	α/2	α/2	α/7
α Maximum	8	4	36	16	7

TABLE III.

Case	A		B		C		D		E		F		G		H		V		W		X		Y		Z	
Schedule	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ	α	δ
Questions 1 to 3 ..	15	8	15	8	15	8	13	7	13	7	13	7	15	8	15	8	10	5	3	2	10	5	8	4	0	0
Question 4 ..	14	4	0	0	14	4	14	4	0	0	0	0	10	3	0	0	0	0	0	0	—	—	—	—	—	—
,, 5 ..	0	0	0	0	0	0	14	28	0	0	—	—	0	0	0	0	18	36	18	36	18	36	18	36	16	32
,, 6 ..	16	16	16	16	16	16	—	—	16	16	16	16	16	16	16	16	8	8	14	14	8	8	8	8	16	16
,, 7 ..	0	0	14	7	0	0	0	0	14	7	14	7	0	0	10	5	0	0	0	0	0	0	—	—	—	—
TOTAL	45	28	45	31	45	28	43	39	43	30	43	30	41	27	41	29	36	49	35	52	36	49	34	48	32	48
RESULT*	A	O	A	O	A	O	A	O	A	O	A	O	A	O	A	O	O	A	O	A	O	A	O	A	O	A

*A = Award. O = Out (no award).

TABLE IV.

Question No.	I	II	III	IV	V	VI	VII	VIII
Type	*Extra Number*	*Synonym*	*Series Completion*	*Last Word*	*Arithmetic Problem*	*Middle Category*	*Series Completion*	*Last Word*
Parts	5	4	5	5	4	4	3	3
Schedule ε : Maximum per Question	5	8 (by 2's)	10	5	4	4	6	6 (by 2's)
For Whole Question : Frequency at 0	38	32	20	3	21	24	41	9
Successive Frequencies*	50 35 16 15 1	47 39 27 10 —	29 33 38 35 —	2 3 6 30 111	78 33 12 11 —	24 8 38 61 —	34 41 39 — —	29 65 52 — —
Not Right-or-nearly-right	139	118	86	44	132	94	116	103
Mark on Linear Basis	9	8	6	3	9	6	8	7
Schedule ζ : Maximum	2ε	ε	ε/2	3 or 0	2ε	6, 4, or 0	ε/2	3 or 0
Top 20 per cent ± (at, on ε)	32(3+)	37(6+)	38(9+)	[111(5)]	23(3+)	[61(4)]	39(5+)	[52(6)]
These top 20 per cent do — parts out of —	3/5	3/4	5–/5		3–/4		3–/3	
Weight	5/3	4/3	5/5–		4/3–		3/3–	
Schedule η per Question (Maximum, by parts)	15	12	10	5, 3, or 0	8†	2 or 0	9	Put with IV
Schedule θ	15, 9, or 0	12, 8, or 0	10, 6, or 0	5, 3, or 0	8, 5, or 0	2 or 0	9, 5, or 0	

* For Questions I, IV, V, VI, at 1, 2, 3, ... ; for II, VIII, at 2, 4, ... ; for III at 1–, 4– ..., and for VII at 1–, 3–, 5–.
† As this was rather of arithmetic problem nature than intelligence test the more appropriate maximum of twelve was not given.

TABLE V.

FREQUENCY DISTRIBUTION OF 153 SCRIPTS.

Total Mark ..	0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	50–	*Award*		*Border Line*	
												Minimum Mark	*No.*	*Minimum Mark*	*No.*
Schedule ε ..	1	7	17	25	24	16	29	23	12	1	—	37	26	35	10
,, ζ ..	10	23	24	21	27	20	15	13	2	—	—	32	25	28	9
,, η ..	2	26	16	18	18	6	15	18	12	8	8	40	28	38	10
,, θ ..	56	31	15	12	14	11	4	3	4	4	1	26	25	22	12

TABLE VI.

Case	K		T		U	
Schedule	ε	θ	ε	θ	ε	θ
Mark for Question I	3	0	4	9	4	9
,, ,, ,, II	4	0	2	0	4	0
,, ,, ,, III	10	10	10	10	10	10
,, ,, ,, IV	5	3	5	0	5	3
,, ,, ,, V	2	0	3	0	2	0
,, ,, ,, VI	4	2	2	0	0	0
,, ,, ,, VII	5	5	6	9	5	5
,, ,, ,, VIII	4	*	0	*	4	*
TOTAL	37	20	32	28	31	27
RESULT	A	O	O	A	O	A

* Put with mark for Question IV.

Résumé.

LA BASE DES NOTES D'EXAMEN.

On considère plusieurs propositions, théoriques et pratiques, pour régler la distribution des notes aux diverses questions, et sections de question, dans un examen, et on en éprouve quelques-unes en les appliquant à l'un ou à l'autre de deux examens :

(a) Un Examen de Bourse d'École Professionnelle, passé en Arithmétique par 253 jeunes filles ;

(b) Un " Test " passé par 155 garçons de 10 ans 8 mois et 10 ans 9 mois.

Supposant que chaque examen avait pour but de choisir le meilleur 20%, les résultats indiquent que les décisions ne varient pas beaucoup, quel que soit le système adopté, quand même ce serait l'extravagant de donner aux questions auxquelles environ 20% des candidats ont fourni des réponses correctes une note très élevée puis de faire une déduction importante pour chaque erreur dans une de ces questions. On suggère que le critérium le plus utile pour la distribution des notes s'obtient en considérant le but de l'examen, dans les deux cas cités une distinction très fine à la ligne de démarcation. Il n'existe point de mesure absolue de succès dans un examen.

Übersicht.

GRUNDLAGEN DER BEWERTUNG.

Mehrere theoretische und praktische Vorschläge zur Bewertung von verschiedenen Fragen und Teilen von Fragen in Prüfungsfragebogen werden in Betracht gezogen, und einige werden ausprobiert, indem sie bei der einen oder der anderen von zwei verschiedenartigen Prüfungen praktisch angewendet werden.

(a) Eine Stipendienprüfung in Rechnen, von 253 Mädchen an einer Handelsschule abgelegt.

(b) Eine Intelligenzprüfung, gemacht von 155 Knaben im Alter von 10 Jahren 8 Monaten und 10 Jahren 9 Monaten.

Nimmt man an, dass das Ziel jeder Prüfung die Wahl der besten 20% war, so zeigt es sich, dass man mit jedem System zu fast den gleichen Ergebnissen kommt ; sogar dann, wenn es ein so überspanntes System ist, dass man diejenigen Fragen streng bewertet, die von etwa 20% der Kandidaten richtig beantwortet wurden und dass man Fehler in diesen Fragen besonders scharf beurteilt.* Es wird behauptet, dass man das beste Kriterium der Bewertung bekommt, wenn man den Zweck der Prüfung in Betracht zieht, und das ist in diesen Fällen eine sorgfältige Unterscheidung an der Grenze. Es gibt überhaupt kein Ergebnis, das man ohne weiteres als „genügend" bezeichnen kann.

*Zu beachten ist dabei der Unterschied in der englischen und der deutschen Bewertung.

TESTS OF MUSICAL ABILITY*.

By JAMES MAINWARING

(From the Department of Education, University of Birmingham).

SYNOPSIS OF TESTS.

TEST SERIES A.—EDUCTION OF PITCH DIFFERENCE.

Test I.—*Two Notes.*
Test II.—*Three Notes.*
Test III.—*Four Notes.*
Test IV.—*Concept of "High" and "Low."*
Test VA.—*Intervals between Sounds heard in Succession.*
Test VB.—*Intervals between Sounds heard together.*

TEST SERIES B.—EDUCTION OF RHYTHMIC PATTERN.

Test VIA.—*Metronome and Tapping.*
Test VIB.—*Buzzer.*
Test VII.—*Rhythmic Word Groups.*

TEST SERIES C.—RECALL OF AUDITORY EXPERIENCE.

Test VIII.—*Immediate Recall.*
Test IX.—*Deferred Recall.*

TEST SERIES A.—EDUCTION OF PITCH DIFFERENCE.

TEST I.—TWO NOTES.

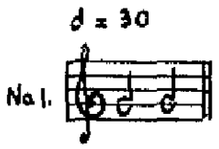
(The testees sit with their backs to a piano.)

THEY have ruled paper, divided into four vertical columns, and numbered close to the left of each column. The name and age of each child is written at the head of the paper. Information is obtained and entered as to any music lessons any testee may be having or have had, any ability to play any instrument, and the existence of any musical relative.

TESTER (*seated at piano*): "I am going to play two notes on the piano. I may play the same note twice, or I may play two different notes. If you think I play the same note twice write 'S' which will

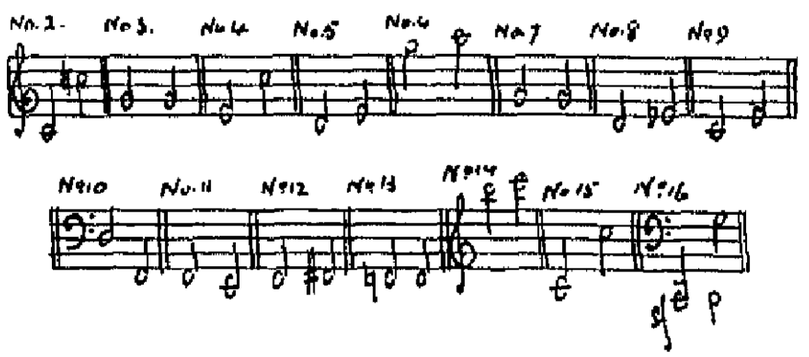
* Being the tests used in *The Experiments on the Analysis of Cognitive Processes involved in Musical Ability*.—BRITISH JOURNAL OF EDUCATIONAL PSYCHOLOGY, Vol. I, p. 180.

mean the 'Same' by No. 1. If you think I play two different notes write 'D' for 'Different.' If you cannot tell, put a dash. Now listen!" (*Tester plays*):



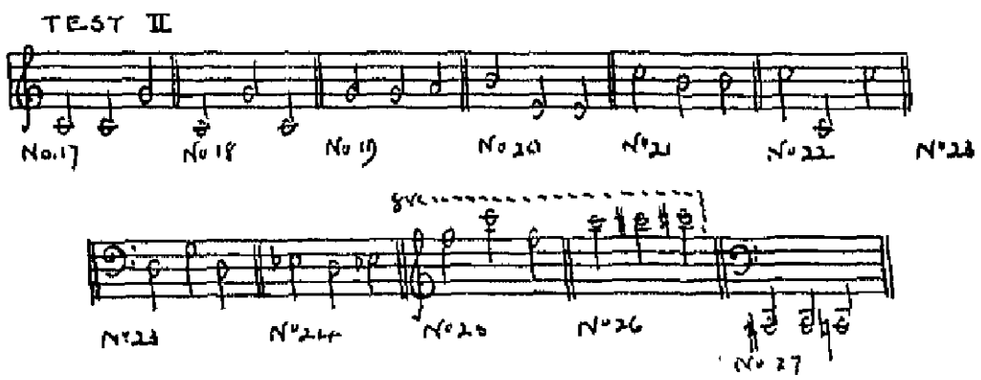
"Now if you think these notes were the same write 'S' by No. 1; if you think they were different notes write 'D'; if you can't tell put a dash. I will play them again for you." (*Does so.*)

"Now No. 2." (*Continue now without further explanation, allowing eight seconds between each question.*)



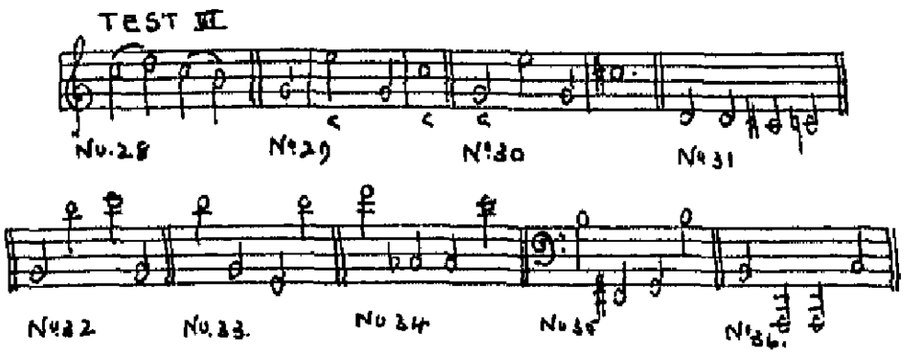
TEST II.—THREE NOTES.
(*To follow continuously after Test I.*)

TESTER: "I am now going to play *three* notes on the piano. *Two* will be the same, the other different. Nos. 1 and 3 may be the same, like 'Jack, Fred, Jack,' or Nos. 1 and 2 may be the same, like 'Jack, Jack, Fred;' or Nos. 2 and 3 may be the same, like 'Fred, Jack, Jack.' Write down which two you think are the same, Nos. 1 and 2, Nos. 2 and 3, or whichever you think they are. Start to write your answers at No. 17 on your paper. Now listen!"



TEST III.—FOUR NOTES.

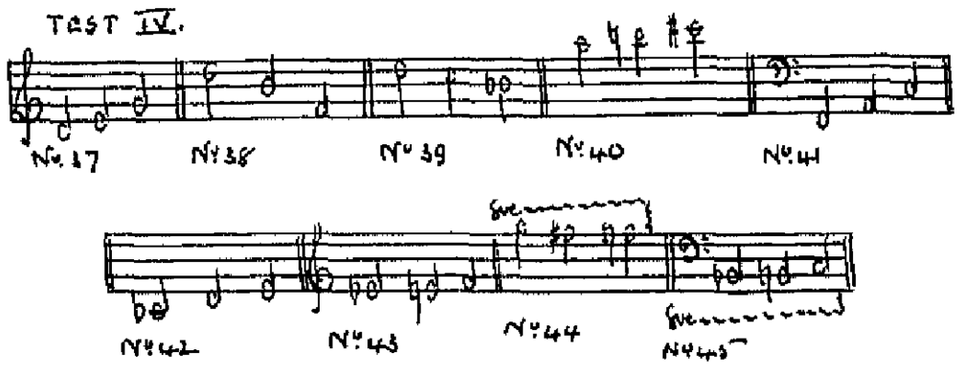
TESTER: "I am now going to play *four* notes. *Two* will be the same. Write down as you did before which two you think are the same. Start to write your answers at No. 28. Now listen!"



TEST IV.—CONCEPT OF "HIGH" AND "LOW."

TESTER: "Now this is a new kind of test. I am going to play something on the piano. Listen!" (*Plays slowly the ascending scale of C Major.*) "Sounds played in that order are said to be 'going up.' Listen while I play them again." (*Does so.*) "Now I shall play the same notes 'going down.'" (*Does so.*)

"Now I am going to play *three* notes. If you think they are going up, write 'Up;' if you think they are going down, write 'Down.' If you can't tell, put a dash. Now listen!"

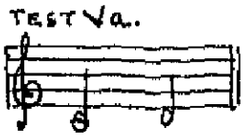


TESTER: "I am now going to play only *two* notes. Write down which you think is the higher, No. 1 or No. 2. Listen!"



TEST VA.—INTERVALS BETWEEN SOUNDS HEARD IN SUCCESSION.

TESTER: "I am going to play two notes which are quite close together. That means that one is only slightly higher than the other. Then I shall play two notes farther apart. Listen!"



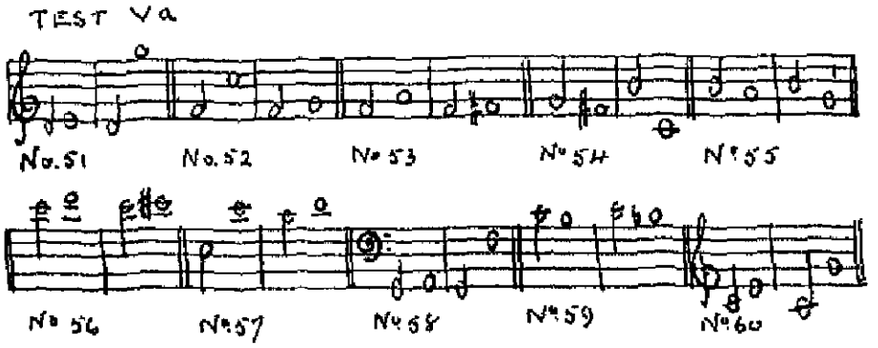
"Those notes were close together."



"Those were farther apart. Listen again!"

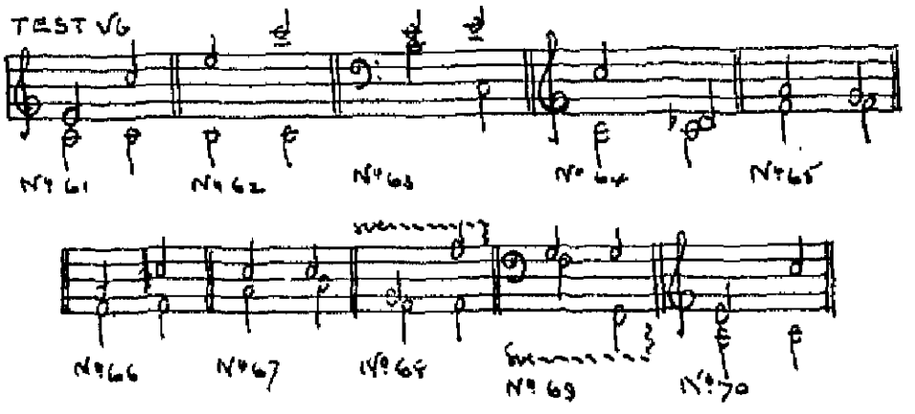


"In the second pair the notes were much farther apart than in the first pair. Now I am going to play some more pairs of notes. Say in which pair, No. 1 or No. 2, you think the notes are farther apart. Begin your answers at No. 51. Listen!"



TEST VB.—INTERVALS BETWEEN SOUNDS HEARD SIMULTANEOUSLY.

TESTER: "I am now going to play the notes of each pair together, like this." (*Plays No. 63 an octave higher.*) "The notes of the first pair were farther apart than the notes of the second pair. I am now going to play some more pairs. Say in which you think the notes are farther apart, just as you did before. Listen!"



TEST SERIES B.—EDUCTION OF RHYTHMIC PATTERN.

TEST VIA.—METRONOME AND TAPPING.

TESTER (*showing a metronome*): "This is a little instrument which will tick like a clock. It is used to measure ticks. We call the ticks beats. Listen while I make it beat for you." (*Places metronome where it is clearly audible, but invisible.*) '— — '— — '— — '— — '— — '— — '— — '— — (MM—120.)

No. 71. TESTER: "I am going to make it beat again. While it is beating write down whether you think it is beating in twos, threes, or fours. Just put the figure 2, 3, or 4 by Question 71. Listen!" (*Avoid any further explanation, even if none of the testees seems to understand the question.*) '— — '— — '— — '— — '— — '— — '— — '— —.

No. 72. (*Adjust metronome to beat in threes at the same rate.*) "Now listen again, and write down in the same way whether you think it is beating in twos, threes, or fours."

No. 73. "Listen again!" (*Repeat No. 71.*)

No. 74. '— — — —. (*Beat 10 bars.*)

No. 75. (*Increase speed to MM—180*): '— — —. (*Beat 10 bars.*)

No. 76. "Now I am going to make beats by tapping with a pencil. Answer in the same way as before. Listen!" (*Tap '— — for 10 bars using a watch and letting two ticks of the watch equal one beat.*)

No. 77. '— — — —. (*Beat 8 bars at same speed as No. 76.*)

No. 78. '— — — — —. (*Beat 8 groups of five at same speed.*)

No. 79. '— — '— — —. (*Alternate groups of two and three at same speed.*)

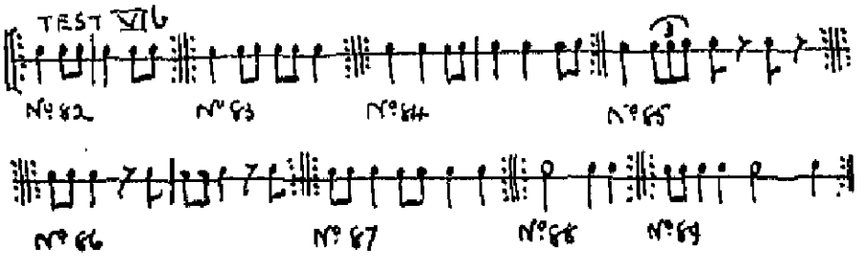
No. 80. '— — — '— — — — '— — — '— — '— — — — — — — — '— — '— — —. (*Irregular.*)

No. 81. '— . — — '— . — — '— . — —. (*The accented beat to be followed by a silent beat of equal duration.*)

TEST VIB.—BUZZER.

(Not included in experiments Nos. 1 and 2.)

TESTER: "I am now going to make the same kind of beats on another instrument. Listen!" (*Play No.* 82.) "Now listen again, and write down your answers as before."



TEST VII.—RHYTHMIC WORD GROUPS.

TESTER: "I am now going to read to you some little verses. They all fit into the same kind of beats to which you have been listening. Write down which kind of beating you think would suit them best, 2, 3, or 4. Begin your answers at No. 90. Listen!" (*Read each example once, with a well-marked but not exaggerated rhythm.*)

No. 90. "Ar'row, ar'row, swift'ly fly'ing,
Deal'ing death' through coats' of steel'."

No. 91. "I'm' little But'tercup, dear' little But'tercup,
Sweet' little But'tercup I'."

No. 92. "Heng'est and Hor'sa were chief'tains from Jute'land, they
Came' in their ships' to the fair' land of Kent'."

No. 93. "Kind'liest and good'liest, yet brav'est of the brave' was he."

No. 94. "There' . is a Hap'py Land . Far' . far away'." (*Same rhythm as hymn tune.*)

No. 95. "As' for our harps', we hang'd' them up', upon the trees' that are therein'." (*Irregular.*)

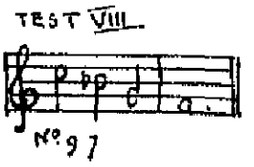
No. 96. "Round' . and round' . we're jog'ging along',
Blow' . the trump'et, . Sing' us a song'." (*Slowly to give a triple rhythm.*)

TEST SERIES C.—RECALL OF AUDITORY EXPERIENCE.

TEST VIII.—IMMEDIATE RECALL.

In order to ensure that the answers are genuinely educed from what is recalled, it is absolutely essential that the testees do not know what question they are going to be asked when the tune is being played. It is for this reason that the questions have been varied. Allow ten seconds after playing each tune before asking the question.

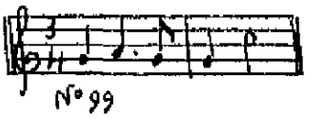
No. 97.—TESTER: "I am going to play a little tune. Listen!"



"Now think over that tune in your mind." (*Allow ten seconds.*) "Now listen again." (*Play it again.*)

"If you think that was the same tune I played before write 'S' by No. 97. If you think it was a different one write 'D.'" (*Allow sufficient time for each one to do this. After a pause say: "If you can't tell put a dash."*)

No. 98. "How many notes were there in the tune?" (*It must not be played again even if no one can answer the question.*)

No. 99. "Listen again."  "How many notes were there in that tune?"

No. 100. "Did the first two notes go up or down, or were they the same?"

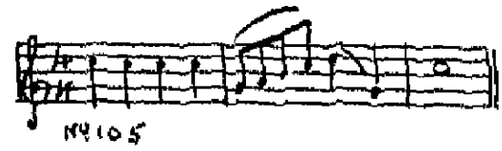
No. 101. "Listen again."  "What kind of beating would suit that tune best, 2, 3, or 4?"

No. 102. "Listen again." 

"How many notes were the same at the beginning?"

No. 103. "How many notes were there all together?"

No. 104. "Was it in 2, 3, or 4 beats?"

No. 105. "Listen again." 

"How many notes at the beginning were the same?"

No. 106. "Did the last two notes go up or down or were they the same?"

No. 107. "Was it in 2, 3, or 4 beats?"

Nos. 108 to 117. Repeat Nos. 98 to 107. The testees must have no suspicion that any repetition has been made.

Test IX.—Deferred recall.

For this test it is essential that the testees shall *not* have heard the tunes mentioned at the time of the test, or at any time previously in connection with the test. The tunes must not be played at any time with any suggestion that questions are to be asked about them. It is immaterial how recently the testees may have heard the tunes so long as these two conditions are fulfilled. It is unlikely that they will have heard the tune to the Christmas hymn since Christmas, however.

No. 118. Tester: "I expect you all know the tune to 'God Save the King.' If you don't, put a cross by Nos. 118, 119, and 120. If you can remember it think of the first two notes in the tune. If they are the same put 'S.' If they are different put 'D,' write 'Up' if they go up, and 'Down' if they go down."

No. 119. "Is it a 2-beat, 3-beat, or 4-beat tune?"

No. 120. "Does the last part of the tune go up or down?" (*Allow time for the testees to reach the end of the tune mentally. Watch for and check any tendency to humming or to finger movements.*)

No. 121. "Think of the tune to 'While Shepherds Watched.' Do the first two notes go up or down or are they the same?"

No. 122. "Is it a 2-beat, 3-beat, or 4-beat tune?"

No. 123. "Do the last two notes of the tune go up or down or are they the same?"

No. 124. "Can you remember a tune in your mind easily or not? Write 'Yes' or 'No.'"

KEY TO TESTS.

SERIES A.

TEST I.
1. S.
2. D.
3. S.
4. D.
5. D.
6. D.
7. S.
8. D.
9. D.
10. D.
11. D.
12. D.
13. S.
14. D.
15. D.
16. D.

TEST II.
17. 1 and 2.
18. 1 and 3.
19. 1 and 2.
20. 2 and 3.
21. 2 and 3.
22. 1 and 3.
23. 1 and 3.
24. 1 and 3.
25. 1 and 3.
26. 2 and 3.
27. 1 and 2.

TEST III.
28. 1 and 3.
29. 1 and 3.
30. 1 and 3.
31. 1 and 2.
32. 1 and 4.
33. 1 and 4.
34. 2 and 3.
35. 1 and 4.
36. 2 and 3.

TEST IV.
37. Up.
38. Down.
39. Down.
40. Up.
41. Up.
42. Up.
43. Up.
44. Down.
45. Up.
46. 2.
47. 2.
48. 2.
49. 1.
50. 2.

TEST VA.
51. 2.
52. 1.
53. 1.
54. 2.
55. 2.
56. 1.
57. 1.
58. 2.
59. 2.
60. 2.

TEST VB.
61. 2.
62. 2.
63. 2.
64. 1.
65. 1.
66. 2.
67. 1.
68. 2.
69. 2.
70. 2.

SERIES B.

TEST VIA.
71. 2.
72. 3.
73. 2.
74. 4.
75. 3.
76. 2.
77. 4.
78. 5.
79. 2 and 3.
80. —.
81. 2 or 4.

TEST VIB.
82. 2 or 4.
83. 2 or 4.
84. 3.
85. 2 or 4.
86. 3.
87. 5.
88. 4 or 2.
89. 6 or 3.

TEST VIII.
90. 2.
91. 3.
92. 3.
93. 4 or 2.
94. 2 or 4.
95. —.
96. 3.

SERIES C.

TEST VIII.
97. S.
98. 4.
99. 5.
100. Up.
101. 3.
102. 3.
103. 9.
104. 2 or 4.
105. 4.
106. Up.
107. 2 or 4.
108. 4.
109. 5.
110. Up.
111. 3.
112. 3.
113. 9.
114. 2 or 4.
115. 4.
116. Up.
117. 2 or 4.

TEST IX.
118. S.
119. 3.
120. Down.
121 Up.
122. 4.
123. Up.

THE GROWTH OF FREEDOM IN EDUCATION.

By W. J. McCallister. (Pp. 13+589. Constable, 30s.)

The concept of freedom includes most of the catchwords so popular in school prospectuses—free discipline, self-government, self-expression, self-realization, and the like. In current use these terms are vague and inconsistent; that is natural and not very important. What is serious is that the notion of freedom in education has been so variously interpreted by the real thinkers—so variously that almost any vagary of practice has been, at some time or another, justified in its name. Hence Professor McCallister has done very valuable service by making this exhaustive investigation of the meaning of the term. Freedom, he says, "is implied in all types of education and its main function is that of a mediator between two very fluid factors—communal and individual values. Its true force appears only when each of these is viewed as a complementary factor of a life process and is interpreted in the broadest and most comprehensive terms. It is, nevertheless, a function exercised only within a specific kind of experience—one in which the limitations of an individual life are removed, so that the very act of removal fosters directly or indirectly the further removal of individual limitation." Thus Professor McCallister finds the only suitable method of investigation to be a "survey of the views or partial aspects of freedom, propounded by writers on education." His book is accordingly a history of educational thought, so far as that is relevant to his particular purpose. It may be remarked in passing that this is an extremely fruitful way to study educational history—to single out one aspect and trace its evolution. A mere list of the authors considered will show the comprehensive nature of the work. In the ancient world Plato and Aristotle represent freedom through control and freedom through the mean; they are followed by an account of Seneca, Quintilian, and Plutarch, and of the Christian Fathers. The next chapters deal with the Middle Ages and the Renaissance, leading on to Montaigne's freedom through "mild severity." In an admirable chapter on "Freedom and Realism" the seventeenth century writers (Bacon, Milton, the Port Royalists, Comenius, etc.) are discussed. Then follow the great modern thinkers: Locke, Rousseau, Kant, Pestalozzi, Fichte, Hegel, Froebel, Herbart, Mill, Spencer, Tolstoy, Montessori, Dewey, Gentile, and Nunn. In addition, certain less famous

writers are included: Isaac Watts, de Crousaz (an eighteenth century satirist), the Scottish David Fordyce, and Manson of Belfast; various critics of Rousseau (e.g., Priestley, David Williams, the Edgeworths, etc.); and Sir Thomas Wyse, whom one is glad to see for once given the important place he deserves. Jean Paul Richter might have been, but is not, laid under contribution; and from the list of English writers the omission of Mr. Edmond Holmes and Professor Whitehead is noticeable. There is an illuminating review of the psychoanalysts, more favourable to Jung than to Freud or Adler; and a very interesting chapter, "The Pupil's Reaction to Freedom," in which various modern experiments are discussed, together with the findings of E. Collings's well-known work on the project curriculum, and of an inquiry conducted by the author on children's own preferences in the matter of freedom in school. (This, though interesting and often amusing, suffers from the inherent weaknesses of some questionnaires; but on this method the last word has been said by Dr. Flexner on p. 125 of his book on Universities.)

Dr. McCallister's treatment is throughout critical. It may fairly be said that he shows sympathetic understanding of the many writers whom he reviews, but that he points out what appear to him deficiencies in their doctrines of freedom. As illustrations may be given his criticisms of Montessori, Dewey, and Nunn. "In three respects," he says, "Montessori's conception seems to be defective. The first defect comes from the idea that liberty can be *given* to the pupil, whereas some forms of liberty have to be found for oneself. . . In the second place, Montessori assumes in the very notion of liberty a certain element of control. . . Having once made freedom the central concept of education, she proceeds on the assumption that all freedom is obtained through a *didactic* control. . . In the third place, there is no evidence that the system as a *whole* has been determined by any really *distinctive* concept of liberty."

In his most appreciative chapter on Dewey, the author concludes that, although "his idea (of social guidance) has illuminated every problem and every activity of education," yet "it is unwise to find the whole meaning, or indeed, the fundamental meaning, of morality in the guidance given through co-operative activities. . . To define freedom solely in terms of social guidance would lead ultimately to forms of education which would fall short of that close relation to individual purpose and striving which the pragmatist rightly urges in the practical activities of life."

In his criticism of Nunn's concept of hormic activity, Dr. McCallister seeks, as usual, to hold the balance between communal and individual

values. He finds accordingly that Nunn tends to lay too much emphasis on the latter; in psychological terms, the instinct of self-assertion (with positive self-feeling) overshadows the complementary instinct of submission (with negative self-feeling). Yet, as Dr. McCallister himself shows, the notion of submission is implicit throughout Nunn's book, and is definitely stated in his discussion of discipline. It is, indeed, all a matter of emphasis. Exaggeration of individual values leads to freakishness and absurdity, that of communal values to equally undesirable abuses; Nunn's sane and balanced account cannot be accused of either excess; in fact it fulfils the concept that Dr. McCallister adopts by way of synthesis, "shapely self-assertion"—"an adjustment of self-assertive and submissive tendencies in accordance with the pupil's inner sense of value."

This sense of value or "relevancy" appears in the author's final definition of freedom in education; "the finding, maintaining, and extending of the highest relevant value common to the pupil's conception of the requirements of his life and the educator's conception of the aspirations that sustain all human activity." It forms the link, or (to use another metaphor), it acts as a criterion, between the two opposing sets of values that have figured throughout the book; its nature is made plain by another sentence of the author's, "freedom is the study of the conditions which ensure real continuity in the pupil's attempts to harmonize his conflicting tendencies."

When one comes to ask how far freedom has been attained in the schools of this country, the answer must be judged by this standard. Actually there are, of course, many different types of hindrance to freedom. One is, and always has been, organized religion. On this subject Dr. McCallister is non-committal: "The submission of human nature to God will be given opportunity to express 'a free man's worship.'" Yet how is this to be interpreted? Does it offer any protection against the worst (because the sincerest) tyranny? "If, perchance," says the author, "the teacher has to confess that these values have no meaning for his life, he will be all the more anxious to keep the doors of the young life open for the possible entry of values which have passed him by." But what if he cannot adopt this negative attitude? He may feel, as strongly as the devout on the other side, that it is his duty to save his pupils from superstitions that seem to him to obstruct the progress of the human race. His function, we read, "is to aid the pupil's search for relevant values." In this particular case how does such a statement help him? In England, fortunately, we are not troubled by State control of educational thought, as are, e.g., Italy and Russia and parts of America.

But we are not ignorant of the political restrictions arising from religious and economic difficulties.

Within the schools themselves there are other sorts of tyranny. The worst is that of examinations, an evil that is gradually becoming realized by the more intelligent of the educational world. That can hardly be said of formal training, in whose name freedom is still vilely mutilated; Professor McCallister discusses it in the chapters on Comenius, Locke, and Watts. An even subtler form of tyranny is that of public opinion—amongst the boys themselves; it is probably more powerful than all the others put together, yet nothing can touch it. The day schools may not be dominated by games and good form as are the public schools, but they have, none the less, their fashions and foibles; are they to be considered forms of relevancy?

These everyday questions are, however, outside the scope of this work. Professor McCallister has brought an immense amount of learning and a clear power of analysis to bear upon this fundamental problem of all education; his book will be the authority for all who claim to pursue freedom as an ideal.

F.A.C.

BOOK REVIEWS.

Genetic Studies of Genius. Edited by LEWIS M. TERMAN. Volume III: The Promise of Youth: By B. S. BURKS, D. W. JENSEN, and L. M. TERMAN. (Harrap. Pp. iv+508. 21s.)

This volume is a sequel to Volume I of Genetic Studies of Genius, in which the mental and physical traits of over one thousand specially gifted children were studied, these thousand having been selected from a quarter of a million children in California. When six years had passed after that first investigation, as many as possible of these young people were re-examined by appropriate mental tests (Binet and Terman for the younger, and the Thorndike College Tests for the older); their educational progress at school was also studied. On the whole it is notable that the high intelligence quotients gained previously by the selected children were to a very considerable extent maintained, there being a slight drop in the younger group (up to thirteen years old) in the case of the boys, and a somewhat greater drop with the girls. The results of the School Achievement Tests of those children whose intelligence score dropped appreciably also proved inferior to the school achievement of those who maintained their intelligence quotient.

When the achievement is measured by grades in schools, the gifted girls surpass the gifted boys in the high school courses, even in science and mathematics. An interesting contribution to the psychology of sex differences is further supplied in the chapter on social and personality traits, in which what are described as masculine traits appear much more frequently among the gifted girls than they do among unselected girls.

The second part of the book deals with particular case studies, and contains material of great interest. For example, the poor performance of scholars of a high degree of intelligence is sometimes traced to mere indolence, or in other cases to the presence of competing interests, for example, music, which absorbed nearly all the time and attention of the pupil concerned. This section also contains a valuable chapter on twins, and one on the relation between precocity in early infancy and performance in youth.

Part three gives an original study of the literary productions of some of these gifted children, their efforts in poetry and prose being compared by competent judges with the literary productions of famous poets and other authors at corresponding ages.

The summary in part four, which also includes the description of prospective further enquiries, concludes a volume which makes these three Genetic Studies of Genius one of the most substantial contributions to the subject yet produced, though as the authors themselves point out, there may be no real "genius," in the strict sense of the term, among their highly gifted children; and most of this volume and of volume 2 of the series are more accurately described by their own sub-titles. The title, however, is unimportant; as to the substance one ought to congratulate Professor Terman and his colleagues on the ability and patience revealed in carrying out this most extensive enquiry. C.W.V.

The Psychology of Foreign Language Study: By H. R. HUSE. (University of North Carolina Press. Pp. 231. 13s. 6d. Oxford University Press.)

The author warns us that this book should not be confused with essays on methodology, based on personal rather than on scientific induction. The subject is the learning process. The psychology of language in an absolute sense is not involved.

This work is long overdue. Had it appeared a decade or so ago, the modern language world might have been spared many vague theories, as most people will

discover after consulting method manuals and text-books that a state of chaos indubitably exists in modern language treatment. It cannot be denied that many discussions of method are but rhapsodies, sometimes suggested by experiments none too carefully conducted, and sometimes merely the expression of a personal view. Huse gives up the attempt to find a universal panacea. He admits of a multiplicity of legitimate aims and seeks to find a common denominator.

Everyone interested in modern language teaching has reason to be grateful to the author for attempting to check experiments which were wandering somewhat. It is good to note that he gives due prominence to the work of West, though it is strange that Huse does not touch upon Flagstad's book, which adopts an attitude slightly similar to the work here considered.

The book contains a large bibliography of twelve pages, gives a clear summary of the author's points at each stage, and, which is very important, suggest a basis for experiment. It should not be imagined that Huse writes only for psychologists.

The book should prove stimulating to all actively engaged in teaching modern languages and should be read along with works on method as a corrective.

A.T.

The Guidance of Mental Growth in Infant and Child: By ARNOLD GESELL. (The Macmillan Company, New York. Pp. 322. 10s.)

In this book Dr. Gesell has put together a number of papers which have been published in scientific and popular journals, together with the exposition of some new material on relevant problems, and a substantial historical introduction to the main topic of the book. The book is written in a free and very readable style without the introduction of much technical material. The first historical part includes a very interesting chapter on the parental method of the mother of the Wesleys, which gives some clue to the type of discipline in the sterner homes of the eighteenth century in England. Later chapters of this part show the enormous development in recent times of attempts to deal with the education of the infant, especially in the United States.

The second part of the book deals with more definitely psychological problems and the methods of child guidance. Here again Dr. Gesell stresses the possibility of remarkable independence in the development of specific abilities. An unusual topic is dealt with in the chapter on accidental deaths of young children, in which some useful statistics are given. The discussion on the parent-child relation and individual guidance for parent and child are on very general and popular lines, but marked by common sense and the gatherings of useful experience. In the last part of the book, which is very brief, perhaps the most interesting chapter is that on mental growth, in which Dr. Gesell gives some account of his experiments with similar twins, pointing to the predominant influence of heredity as compared with specific training, at least in the case of some abilities which seem to develop through mere ripening and without special exercise. Incidentally the book will serve as an admirable introduction to Dr. Gesell's own earlier and more technical volumes.

A History of Educational Thought: By PERCIVAL R. COLE. (Oxford Univ. Press, Mr. Milford. Pp. x and 316. 10s. net.)

The single volume is made up of five books, one being devoted to each of the following epochs of educational thought: Greek, Roman, Middle Ages, Renaissance, Modern. In each book in turn the author has treated the period in regard to the principal influences bearing on the educational thought and development within it, and has in this connection broken ground which has hitherto received little attention, at least so far as the average student of education history is usually concerned. For example, in Book II, while the ordinary topics of Roman thought are dealt with, sections deal specifically with Ausonius, Martianus Capella, and the ideals of Christian, Stoic, and Neo-Platonic Education. In later books, Abelard, Dante, the Encyclopædia of Alsted, the educational views of Luther and Erasmus are outlined. The fifth book, dealing with some aspects of modern thought, begins with Comenius; a short section treating of the Revolutionary Theories of Higher Education fills a gap between Rousseau and the nineteenth century; other sections are devoted

to Herbart (who by the way was Johann Friedrich, and not Heinrich), Spencer, and Anatole France. The last section of all compares the British path to culture with that of the United States, and is by no means the least interesting part of the whole book. It is perhaps a pity that after the space devoted to the sense-perception of Pestalozzi, which most educationists have ample opportunity of studying in minute detail, so little attention is given to the intellectualism of Herbart and the doctrine of interest; but this is in the present writer's opinion a slight flaw in an otherwise excellent piece of work. A.P.B.

Universities, American, English, German: By ABRAHAM FLEXNER. (Oxford University Press. Pp. 381. 16s.)

This book is an expansion of lectures on universities given at Oxford in May, 1928, on the invitation of the Rhodes Trust. The volume, which is undoubtedly a remarkable and most stimulating one, now covers a discussion on American universities, English and German universities, preceded by a chapter on "The idea of a modern university." American universities are most fully dealt with, not unnaturally, as the author is himself an American; and they receive by far the most severe criticism. In general they are criticized for spending their energies in too many and too trivial types of work and especially for the narrow and too practical nature of much of their research work. The author makes great play with the titles of some of the subjects which can be studied for a degree in some American universities: for example, "advertising lay-outs," "practical poultry raising," "business English," "newspaper practice," and so forth. He also criticizes severely the method commonly in vogue which secures the completion of requirements for a degree by the attendance of specified courses for a certain number of hours in the year. In general, Mr. Flexner is especially antagonistic towards *ad hoc* training; indeed his repeated stressing of the value of general training suggests that there is at the back of his mind still a good deal of the old idea of faculty training.

It is against the subjects for research in American universities that the author directs his most scathing criticisms; and indeed some of the topics that he mentions certainly appear exceedingly trivial; for example: "an analysis of janitor service in elementary schools," and, as examples for M.A. theses: "buying women's garments by mail," and "style-cycles in women's undergarments." Mr. Flexner himself, however, in the much more friendly treatment he gives to the German universities, points out that the apparently trivial subject in which Dr. Stresemann obtained his Doctorate, namely "The development of the bottled beer trade in Berlin," covered a much sounder piece of work than might appear from the title, because Stresemann treated it as an evidence of the decline of the independent middle class. It seems highly probable that many of the topics which have been the subject of research as recorded by Mr. Flexner in American universities may also cover much sounder work than he imagines. He does not allow sufficiently for the fact that it takes the expert in a subject to understand what may be involved. For example, nothing but considerable ignorance of modern psychology can have led Mr. Flexner to include among his trivial topics "Suggestion in Education."

As Mr. Flexner appears to have spent little more than a year in Germany and England in the study of the universities there, one can hardly expect him to have acquired such an intimate knowledge of university life as to avoid making some serious errors. Many of his criticisms and comments are of course very suggestive and valuable; but on some matters he seems to have relied upon hints from one or two individuals and to have been led sadly astray. Presumably it was in Oxford that he was informed as regards the study of education that "nowhere was it seriously taken," not seriously enough apparently in his own view, superior as he thought it to what obtains in America. He does not appear however to have heard of the substantial work now being done in a number of our universities in courses leading to a higher degree in education. In spite of this view as to the lack of serious study, by the way, he quotes freely and rightly, as an authority on certain aspects of education, the work of a professor of education, namely Professor Dover Wilson.

It is surprising that the author's wide acquaintance with universities has not brought home to him the fact that even a distinguished scholar in one subject is apt

to smile at the topics on which colleagues in other subjects are working, as relatively unimportant and trivial (especially when one is in an Arts faculty and the other is a scientist), through that lack of background of knowledge which alone makes the importance and complexity of the problems understandable. This applies especially in reference to relatively newer sciences such as Psychology and in its modern form Geography, and to the scientific study of education. Anyone may be excused for lacking the encyclopædic knowledge which would prevent such lack of understanding: but they cannot be excused for criticizing what in the nature of the case they cannot be qualified to judge fairly.

A similar lack of first hand experience seems to affect Mr. Flexner's criticism of the use of the questionnaire as a method of enquiry. It is true that some questionnaires are so vague, so slack in the method of selecting persons to whom the questions are sent, and so forth, that the results are worthless and even misleading. But this *need* not be true of the method of the questionnaire: the criticism that "words never mean precisely the same thing to different persons" one can surely apply also to opinions gathered by word of mouth—Mr. Flexner's chief method. One suspects that if he had used a carefully planned questionnaire he might have checked more accurately some of the accusations he makes about certain types of university work in America and England.

Of English universities, perhaps London comes in for severest criticism; indeed, the author is "unable to understand in what sense the University of London is a university at all." In general he thinks American universities too highly and English Universities too little organized.

With his ideal that a university should stand for the development and dissemination of disinterested knowledge and fundamental studies all university teachers will agree: and also that the close intercourse between student and teacher is a vital factor. It is the danger of this being lessened by the enormous number of students in German Universities that is one of Flexner's most serious criticisms of German universities, for which on the whole, however, together with Oxford and Cambridge, his warmest admiration is felt.

If I have dwelt rather upon what seem to me weaknesses in the book than upon its merits (one of which is the clear and vigorous style) it is because other reviews that I have seen have fully stressed its undoubted merits.

The subject is so large and complex that one is not surprised if a treatment of it is not free from errors. As Dr. Johnson said of a dog walking on its hind legs, one is not surprised if it is not done well. The surprising thing is that it should be done at all. C.W.V.

Methods of Choosing a Career: By F. M. EARLE, M.Ed., B.Sc., and others. (Geo. G. Harrap and Co., Ltd. Pp. 334. 12s. 6d.)

Although it may seem a matter of common sense that children guided in the choice of a career by a close study of their physical and mental qualities would prove more successful in their industrial occupations than those who picked up their jobs haphazard, sound statistical evidence on the point is obviously indispensable before the methods of vocational guidance are applied on the large scale.

The present book describes an experiment by the staff of the National Institute of Industrial Psychology in the application of vocational guidance to children leaving elementary schools in one of the poorer districts of London, and it may at once be said that the case for some sort of guidance has been proved beyond reasonable doubt.

Six hundred children of both sexes of the approximate age of fourteen were subjected to a thorough medical examination and a series of intelligence and special ability tests; the evidence thus obtained was combined with observations concerning each child's interests, temperament, character, and home conditions, and the sum total of information was translated into a vocational recommendation after a most careful study of all relevant factors in the evidence.

Roughly the first half of the book is concerned with the experiment up to this point; chapters describe first the general aims and the scheme of the experiment, and then the vocational study of the child. The deplorably low standard of physical health and intelligence here revealed calls for special comment. To the psychologist and all interested in the study of vocational guidance and selection, the section dealing with the psychological tests and their inter-correlations will be very welcome.

The second half of the book deals with the study of the after careers both of the experimental group and of a control group of a further 600 children. The latter received practically no vocational advice, since the school conference set up by the Ministry of Labour to give such advice was able to do little more than suggest employment in accordance with the child's own wish. Experimental control was further obtained by a comparison within the experimental group of those who followed the Institute's recommendations with those who did not.

The degree of success in subsequent employment was estimated from the length of time a post was retained, from employers' reports on the children, and from children's reports on the jobs. An exhaustive analysis of the statistics is given, and it is impossible to avoid the conclusion that those taking up the employment recommended achieved greater success and contentment in their work.

The experimental group had the advantage over the control group of a closer survey of temperament and character, a more exhaustive medical examination, and the use of psychological tests; a relation between the psychological tests alone and the ultimate vocational success has not yet been brought out, and it is to be hoped that a report on this aspect of the experiment will be made as suggested.

The most striking feature of this second half of the book is the skilful and devoted work of the Institute's staff in the seemingly impossible task of collecting information from incompetent employers and illiterate children, and in sorting out the maze of data thus gathered and presenting it in such closely reasoned argument. Incidentally the book adds to the already large volume of evidence that the application of vocational selection methods to *employers* is long overdue!

A complex subject has been treated with admirable lucidity, and by way of relief the humorous aspect of the enquiry has not been altogether forgotten. The book will make a strong appeal to those interested in sociology, education, and vocational psychology. One class, however, will be disappointed; the average parent in doubt as to the choice of a career for his child will find little to help him in his decision, unless he is persuaded to take his difficulties to the National Institute of Industrial Psychology. The popular appeal of the title is therefore unfortunate.

A more extensive index would increase the utility of the book. W.G.E.

Minnesota Mechanical Ability Tests: By D. PATERSON, R. ELLIOTT, D. ANDERSON, H. TOOPS, and E. HEIDBREDER. (The University of Minnesota Press, Minneapolis. Pp. 586.)

This substantial volume is the report of an investigation subsidized by the Committee of Human Migration of the National Research Council, and carried out by the Department of Psychology in the University of Minnesota. It describes a thorough-going enquiry directed towards discovering reliable tests of mechanical ability, which would be of real prophetic value in selecting boys for mechanical work, and also directed towards the discovery of further evidence on the problem as to whether there is any such thing as general mechanical ability, how it is related to intelligence, and so forth. Incidentally, the book gives an account of a considerable variety of tests of mechanical ability which were themselves tested, some being found highly satisfactory and some unsatisfactory. The criterion of a test was not only reliability and inter-correlation with other tests, but the degree to which it conformed to reports on the actual mechanical ability shown by boys in the workshop after some years of training, and as reported by several independent judges. For the purpose of establishing a criterion observations were made in the high school vocational shop courses.

Of the main results we may call special attention to the high reliability of the Minnesota Assembly Test, the Paper Form Board Test and the Spatial-Relation Test, which proved of greater value, for example, than some of the Stenquist tests. The general evidence of this research emphasizes the specific nature of mechanical abilities and minimizes the interference of general intelligence in such performances. The authors also come to the conclusion that a mechanical ability is distinguishable from what they call "motor ability." One rather surprising result is that boys are shown to be less superior to girls than is generally supposed in matters of mechanical ability. A point of practical importance is the suggestion that it is futile to assume that a boy who is an academic failure should therefore have training in mechanical work, and specific tests for mechanical ability are strongly advocated. The whole work constitutes a most useful contribution to this important and complicated problem.

The Language Development of the Pre-school Child: By DOROTHEA McCARTHY. (University of Minnesota Press. Pp. 174. $2.50.)

This is a most useful contribution to the study of the speech development in young children. After a survey of earlier work, the writer goes on to describe a wide and thorough enquiry into the speech of twenty infants at each of the age levels, 18 months, 24, 30, 36, 42, 48 and 54 months. The method of study allowed for and indeed encouraged spontaneous remarks, as well as responses. The first crude measure of development was the mere length (in words) of the "response." This was throughout somewhat greater among girls than boys. This superiority remained even when variations in mental age were allowed for.

The parents of the children tested were classified according to occupation, thus: (1) Professional, (2) Managerial, (3) Clerks, (4) Skilled Labour, (5) Semi-skilled Labour, (6) Unskilled Labour. The numbers would tend to be very small in each of the ages groups, yet it was noted that the length of response was greatest for group (1), almost throughout, next greatest for (2), and lowest for (4), (5), and (6).

Similar superiority of girls and of the higher occupation groups were noted when other criteria of the speech were used, e.g., functional analysis, construction of sentences (though the sex differences lessens here), etc.

The book concludes with a concise discussion of some more general problems, including "Language and Thought," and the whole book forms a most clear and compact study of the subject. C.W.V.

Individual Psychology: By ERWIN WEXBERG, M.D. Translated by W. B. WOLFE, M.D. (George Allen and Unwin. Pp. 442. 15s.)

This is an exposition of Adler's psychology by one of his ablest fellow workers in Vienna. It is a well arranged and well written exposition of what has come to be called "individual psychology" in certain quarters, although that term is misleading to the general student of psychology and ought not to be confined to the particular views of the school concerned.

Dr. Wexberg writes clearly about topics and points of view which are too often very obscurely treated, and generalized statements are well supported by individual examples. In particular, he aims at showing that Adler's psychology involves much more than the "inferiority complex" and the "will to power." The book should form a useful introduction to the study of this particular school of thought.

Fathers and Sons: By E. B. CASTLE, M.A. (University of London Press. Pp. 160. 3s. 6d.)

This is a thoughtful and admirably written book which will be provocative of thought to parents and teachers, though primarily intended for the former. The psychology is of an elementary and popular and sometimes rather fallacious type, though this does not seriously affect the main contentions of the book, which should serve a very useful purpose.

L'Education Fonctionnelle: By DR. ED. CLAPARÈDE. (Published by Delachaur et Niestlé. Pp. 263. 4.50fr.)

In this collection of essays, some of which date back to 1912, Professor Claparède expresses different aspects of his views on the purposive nature of the human mind. Psychology for him must never forget purpose; and, whether it is discussing action or structure, must always look to the end served. Nowhere is this more important than when we attempt to apply psychology to the problems of education.

Some of his topics are important, as in his discussion of why men are born immature and helpless, instead of completely able to look after themselves, as are many of the insects. Professor Claparède exhorts us to see infancy in relation to life as a whole, and to ask ourselves what purpose it has and how that purpose can be best fulfilled.

Sometimes the matter is trifling, though the conclusion ingenious, as his theory that we yawn to increase the cerebral circulation, and that, therefore, a yawning pupil is one who is making an effort to attend, and is not merely lazy.

There are other essays on the Psychology of Intelligence, the Nature of the Will, and the Psychology of Teaching Languages. M.S.

A graphic method of obtaining the partial-correlation coefficients and the partial regression coefficients of three or more variables: By ERNEST RICHARD WOOD. (Univ. of Chicago, Ill. Pp. xii+72. $1.)

A very useful method which the author shows combines quickness with accuracy and can easily be learned in a few minutes by comparatively unmathematical workers. The curves are based on deductions made from the Yulian formula,

$$r_{12\cdot3}=\frac{r_{13}-r_{13}\,r_{23}}{\sqrt{1-r_{13}}\,\sqrt{1-r_{23}}}$$

in the first instance. The argument is on the whole sufficiently clearly set out for those who have mathematical training to follow so that they can assure their students that the charts are reliable from a theoretical point of view; and practical evidence of the reliability is provided. A little confusion is caused by the lateral inversion of the curve in Plot D (p. 29), and the reproduction of the combined charts (Plate I, opposite p. 40) is too small to allow the reader to use it, as the figuring is indistinct. The information is all in the book, however, and with time and patience the investigator could construct the whole set of graphs for his personal use. A.P.B.

Psychopathology: a Survey of Modern Approaches: By J. ERNEST NICOLE. (Balliere, Tindall and Cox. Pp. 203. 10s. 6d.)

As Dr. Stoddart says in his "foreword" there is evidence in this book that Dr. Nicole has done an enormous amount of reading of modern literature bearing on the subject, and he has here attempted a brief text-book which will give to students an exposition in a brief space of the theories of the leading thinkers. Dr. Nicole is certainly clear and to the point, and his various chapters on Morton Prince, Freud, Adler, Jung, Rivers, etc., will help the student who is beginning to be bewildered by the variety of views in the psychology of the unconscious and psycho-analysis. The treatment, however, is necessarily very brief and can only be regarded as a guide and clue to further reading. Furthermore, in some ways the book is incomplete and unbalanced. It is extraordinary, for example, to find in a book which deals personally with so many writers (the index of names includes about 250), no reference whatever to such a writer as Flugel among English writers, and the treatment of some general points of psychology is even superficial. On the whole, however, the book will be a useful handbook for the student at the middle stages. C.W.V.

Violin Technique: By S. ROBJOHN. (Oxford University Press. Pp. 107).

Professor Sydney Robjohn, in the preface to his book "Violin Technique," expressly states that the object of the book is essentially to help students and teachers to master certain difficulties which are apt to prove stumbling-blocks to all would-be violinists. His book, as he says, "is not an exposition of the art of violin playing."

It was with great interest that I read Professor Robjohn's book. I feel it is one that might well be used by teachers and students not only of the violin but of other stringed instruments as well. Professor Robjohn deals in a very competent manner with a number of the most outstanding difficulties in violin playing and suggests methods by which those difficulties may be overcome.

Two points in his book I would note as being particularly relevant not only to the teaching of violin but to the teaching of any musical instrument. One is the necessity for analysing faults. This to the modern teacher goes without saying, but it is as well to have the case re-stated. The second is that technical brilliance, however great, will not make a musician. Musical imagination *must* be present, but the wise teacher uses this musical imagination all the time, and not least in those technical exercises which form a large aspect of a pupil's training. D.W.S.

Health and Education in the Nursery: V. E. M. BENNETT AND SUSAN ISAACS. (Rouledge. 6s. Pp. 308.)

The Gateways of Learning: MARGARET DRUMMOND. (University of London Press. 6s. Pp. 190.)

The study of young children is rapidly attracting more notice, and as the professional psychologist points out that the foundations of character are mainly laid down in the very early years, parents and teachers become increasingly anxious for guidance.

The first of these books is for the parent. Miss Bennett discusses the child's physical and Mrs. Isaacs its mental development. Clearly, in non-technical language, they give good advice which will be very helpful to anyone wishing to help and understand the development of a baby from birth to about six years of age.

Miss Drummond's book is for the teacher. It contains chapters on mental tests, reading, writing, drawing, and number, which present, in simple language, without too much complication, many of the results of modern research. M.S.

Questions Actuelles de Pedagogie. First Volume of a series published under the heading "Les sciences et l'art de l'education," Editions du Cerf, Juvisy, Seine-et-Oise. (200 pp. 10 fr.; post free, abroad 13 fr.)

This appears to be the considered opinion of prominent Catholic teachers abroad upon modern tendencies in pedagogics, expressed in a volume of six monographs. The influence of psychoanalysis, the use of private study, the aims of education and experimental psychology, are among the themes discussed freely and in such a way as to keep to the practical issues in all instances. Many people read French nowadays, but as so many still do not it might be worth while for the publishers of this interesting volume to consider putting an English translation on the market for British, Colonial and American readers. The book deserves a wide circulation and is a pleasing augury of the quality of those to follow in the series. A.P.B.

The Young Child and his Parents: By JOSEPHINE C. FOSTER and JOHN E. ANDERSON. (University of Minnesota Press. Pp. 247. $2.00.)

This is a revised edition of a book giving a study of one hundred case histories of children between the ages of two and six years, with a description of the home environment and of the problems of discipline which arose. As Principal of a nursery school and Director of the Child Welfare Institute connected with the University of Minnesota, the authors had exceptional opportunities for the study of such cases. The advice given to the parents is recorded and in this new edition further observations a year (or up to four years) later are added. Some of the main conclusions and generalizations are briefly indicated in the introduction, and the book constitutes a useful contribution to child-guidance problems, especially as illustrating the rich variety of problems arising and the influence of what are called "good homes" in reducing the number of problems as the child gets older.

History of Secondary Education: By I. L. KANDEL. (Harrap and Co., Ltd. Pp. xvii+576. 10s. 6d. net.)

Part I of this volume is devoted to a general account of developments from early times to the eighteenth century academies.

Part II occupies two-thirds of the volume and deals with developments in France, Germany, the United States and England, from the eighteenth century to date.

Dr. Kandel's work is a useful addition to the library of History of Education, bringing as it does much of the matter treated in separate works within the covers of one book. It should prove particularly useful to the student of comparative history.

Not only is the work good, but the publishers have seen their way to offer it at a reasonable price; in fact it is an excellent half-guinea's worth. A.P.B.

The Management of Young Children: By W. BLATZ and HELEN BOTT. (J. M. Dent and Sons, Ltd. Pp. 354. 10s. 6d.)

This book is confessedly designed as a text for "study groups" and a great deal of space is occupied by examples, real or imagined, of difficult children, and problems of discipline, to serve as illustrations for the text and topics for discussion. The main text of the book makes no profession to be a systematic or scientific psychology, but it is based upon an evident familiarity with good recent psychological study of children; and the applications of the same are governed, as it seems to us, by sound common sense. The book will be primarily useful for parents, but teachers will find much that is suggestive.

Language in Education: MICHAEL WEST, M.A., D.Ph. (Longmans, Green. Pp. 177.)

Dr. West is of the Indian Education Service, and his book is mainly concerned with the teaching of English to Indians. It is an important problem, as English is not only an official language in India, but also a means of communication between Indians of different races. Moreover, it is a very difficult one, because most of this teaching is necessarily done by Indians whose knowledge of English is often deficient. The style of the book is such as would fit it for its original purpose—a course of lectures at Patna University. M.S.

Alcohol and Behaviour: By SYDNEY SMITH, M.D., Regius Professor of Forensic Medicine, University of Edinburgh. (Oliver and Boyd. Pp. 37. 6d.)

This is the Henderson Trust Lecture for 1930, and gives a most valuable summary of quite recent work bearing on the relation between alcoholism and human conduct and human well-being. It includes particularly interesting statistics in reference to the relation between alcohol drinking and the increase or decrease of certain kinds of crime, and as to the effect of alcohol on longevity.

FOREIGN JOURNALS.

Zeitschrift für Pädagogische Psychologie. (Leipzig, Mai-Juni, 1931.)

This number is dedicated to Professor William Stern on his sixtieth birthday. It contains a paper on the creative person "Der schöpferische Mensch," by Professor O. Selz, of Mannheim. Various cases are culled from the literature of sudden happy ideas in various fields of activity, including those intuitions regarded as divine revelations, and some extreme cases accompanied by great mental excitement. Among the authors quoted are Rousseau, Helmholtz, and Goethe.